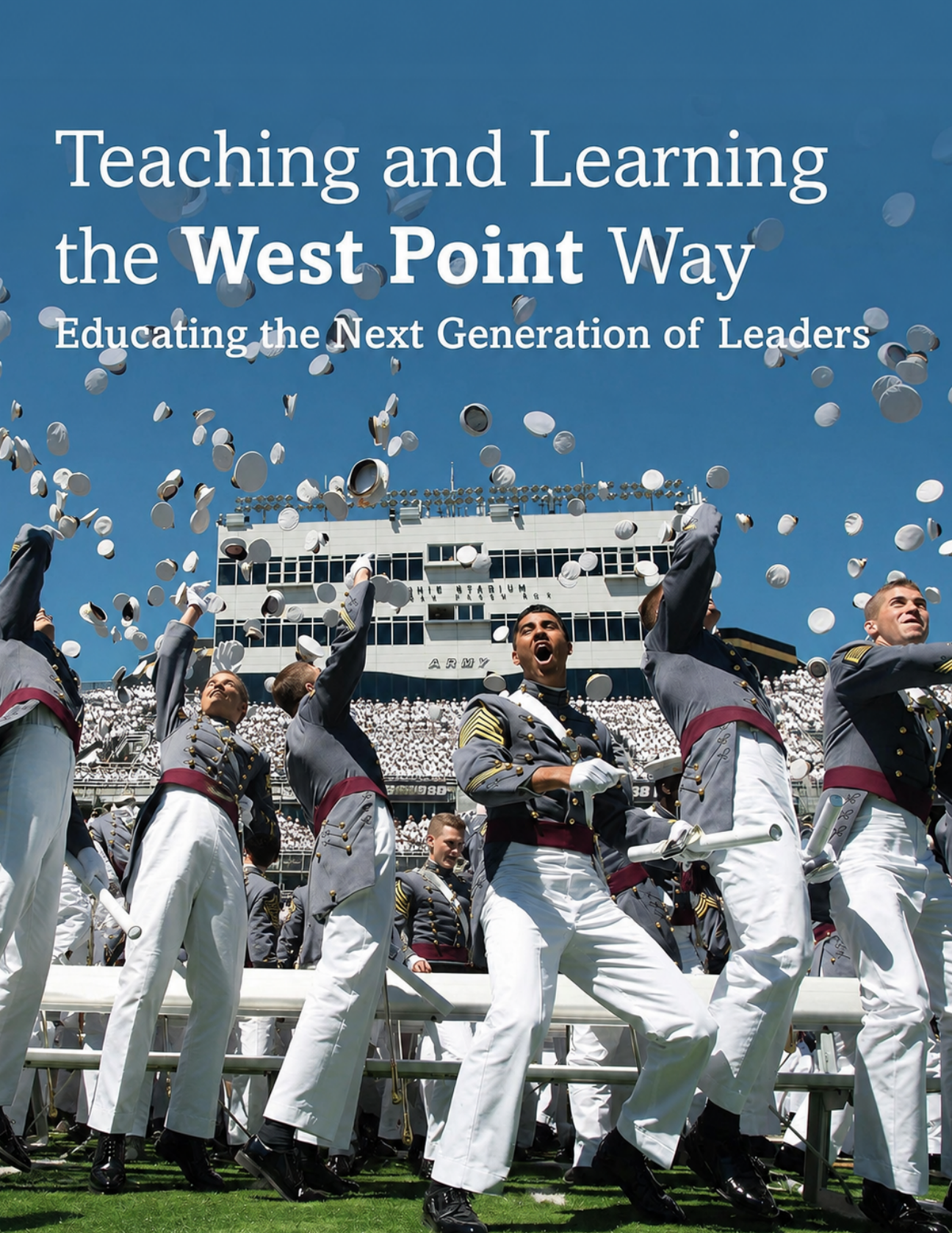
Teaching and Learning the **West Point** Way

Educating the Next Generation of Leaders



Edited by **Morten G. Ender, Raymond A. Kimball, Rachel M. Sondheimer** and **Jakob C. Bruhl**

ROUTLEDGE

Teaching and Learning the West Point Way

Teaching and Learning the West Point Way is a unique compendium of the best teaching and learning practices from one of the most celebrated and storied undergraduate teaching and learning environments and institutions in America – the United States Military Academy at West Point, New York, USA.

Drawing on the broad academic curriculum that the students follow at West Point – in addition to military leadership, character development, and competitive athletics – this book describes proven and effective undergraduate pedagogy across a number of academic disciplines. Case studies, strategies and techniques, empirical teaching and learning research results, syllabi, and assignments developed and deployed by West Point faculty are included, which faculty in other higher education institutions can adapt and apply to their own programs and courses. An accompanying companion website provides additional syllabi, course guides, lesson plans, PowerPoint activities, and lecture slides, as well as videos of the editors and authors discussing how key concepts in their chapters might be applied in different teaching and learning contexts.

This is an opportunity to gain an in-depth insight into the programs and practices inside one of the world's premier leadership development and educational institutions. It should appeal to new and experienced faculty and administrators interested in course creation and syllabus design across a wide range of disciplines in educational institutions and military academies across the globe.

Morten G. Ender, Professor of Sociology and Co-Director of Diversity & Inclusion Studies, Department of Behavioral Sciences and Leadership, U.S. Military Academy at West Point.

Raymond A. Kimball, Chief of Faculty Development, U.S. Military Academy at West Point.

Rachel M. Sondheimer, Vice Dean for Academic Affairs, U.S. Military Academy at West Point.

Jakob C. Bruhl, Associate Professor of Civil and Mechanical Engineering, Department of Civil and Mechanical Engineering, U.S. Military Academy at West Point.

"This book encourages bridging between disciplinary areas to facilitate collaboration amongst faculty and to optimize opportunities for student learning. It is perfect for faculty development programs that aim to engage faculty in small interdisciplinary cohorts that can discuss course pedagogy and share effective approaches to course creation, syllabus design, and assignment development. The editors are uniquely qualified to promote the book's interdisciplinary message based on a blend of expertise that cuts across various academic disciplines and the civilian and military faculty at West Point."

Jeffrey B. Lovelace, *Assistant Professor of Commerce, University of Virginia, United States of America*

"This book is unique in that it covers military education and design 'soup to nuts' – that is, from top-level design to lesson-plans, as well as overarching strategies. There are a significant number of military education institutions in the US and US-looking countries that would find this useful."

Kristian Gustafson, *Reader in Intelligence and Security Studies, Brunel University London, United Kingdom*

"This volume's combination of syllabi, assignments, and articles make it a unique and valuable resource for teachers from the secondary to the university levels. For educators who are willing to explore pedagogical practices applied in varied disciplines to see how they might adapt a given assignment or teaching technique in their own discipline/classroom, this volume stands out as a highly practical interdisciplinary work of scholarship."

Ryan Kelty, *Associate Professor of Sociology, United States Air Force Academy, United States of America*

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Raymond A. Kimball,
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Routledge
Taylor & Francis Group
LONDON AND NEW YORK

First published 2021
by Routledge
2 Park Square, Milton Park, Abingdon, Oxon OX14 4RN

and by Routledge
52 Vanderbilt Avenue, New York, NY 10017

Routledge is an imprint of the Taylor & Francis Group, an informa business

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British Library Cataloguing-in-Publication Data
A catalogue record for this book is available from the British Library

Library of Congress Cataloging-in-Publication Data
Names: Ender, Morten G., 1960– editor. | Kimball, Raymond A., editor. | Sondheimer, Rachel M., editor. | Bruhl, Jakob C., editor.
Title: Teaching and learning the West Point way : educating the next generation of leaders / Morten G. Ender, Raymond A. Kimball, Rachel M. Sondheimer, Jakob C. Bruhl.
Description: Abingdon, Oxon ; New York, NY : Routledge, 2021. | Includes bibliographical references and index.
Identifiers: LCCN 2020052437 (print) | LCCN 2020052438 (ebook) | ISBN 9780367685850 (hardback) | ISBN 9780367685867 (paperback) | ISBN 9781003138181 (ebook)
Subjects: LCSH: Education, Higher—Curricula. | United States Military Academy—Curricula. | Leadership—Study and teaching (Higher)
Classification: LCC LB2361 .T43 2021 (print) | LCC LB2361 (ebook) | DDC 378.1/99097473—dc23
LC record available at https://lccn.loc.gov/2020052437
LC ebook record available at https://lccn.loc.gov/2020052438

ISBN: 978-0-367-68585-0 (hbk)
ISBN: 978-0-367-68586-7 (pbk)
ISBN: 978-1-003-13818-1 (ebk)

Typeset in Bembo
by Apex CoVantage, LLC

Access the companion website: www.routledge.com/cw/ender

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Foreword

The United States Military Academy is an academy in its purest form. Cadets, staff, and faculty learn and grow together for a common purpose: defense of the republic. Our mission is to develop leaders, leaders of character, to be specific. The USMA Academic Program is one of four programs – academic, military, physical, and character – that work in tandem to help grow future leaders for the U.S. Army, for the nation, and for society.

The academic program focuses on educating and inspiring leaders of character who think critically, internalize their professional identity, and employ their education to help build the Army and the nation's future. We have been doing this for over two centuries and continue to adapt to an ever-changing world. The COVID-19 pandemic that began in 2020 reminds us that teaching and learning can take many shapes and forms. Higher education's move to remote learning is a necessary reminder that the transformative goal of education – to help students learn how to think, not what to think – can be achieved in all sorts of ways, across a variety of venues and myriad disciplines. The variable that cannot change across modalities is a faculty dedicated to this enterprise of academic excellence and informed pedagogy.

At West Point, a significant portion of the educational experience centers on a broad liberal education that provides a balanced introduction to humanities, social sciences, and STEM fields. Such an education empowers students to be able to think critically, deeply, and across all disciplines. The West Point education emphasizes the importance of humility, so students know and value different ways of thinking through hard problems amid uncertainty and ambiguity. It also instills a confidence of one's own agency in a world that is not binary but rather a sea of grays. A broad liberal education provides the space to explore, to learn, to grow. Education is transformative for both teachers and students.

The success of this educational experience rests on the relationship between faculty and students. We purposefully arrange for small classes that maximize the interaction between faculty and students. Small classes are essential in the foundational courses of the core curriculum as well as in the field of study majors. This combination of small classes across an array of disciplines taught by highly skilled and engaged instructors allows us to encourage cadets to understand how to think rather than what to think. Students and faculty learn from one another, and in the process, they learn about themselves.

Teaching is not confined to the walls of the West Point classroom, though. In addition to engaging with cadets during class, this group of dedicated faculty members works with cadets on original scholarship and research endeavors, mentors cadets on academic trips, advises cadets in their academic clubs, works with them over the summer in military training, and helps mentor our athletes in their competitive endeavors. The combination of in-class and out-of-class opportunities helps forge trusted bonds between cadet and

faculty, necessary to develop leaders of character who are self-aware, confident, and humble. Ours is not the only way to teach in higher education, but it is the West Point way.

What makes teaching and learning at West Point so special is the blend of military and civilian instructors who bring to the classroom different experiences, areas of expertise, and backgrounds. Our faculty serve as guides and role models for the next generation of junior officers. More than half of our faculty, after attending graduate school and teaching, will return to the operational force and serve with the cadets they have taught. Other faculty members will continue to serve at West Point in uniform, bridging the Army and higher educational perspectives, while civilian colleagues contribute a depth of knowledge honed through rigorous training in graduate school and years of teaching experience. While our faculty might look different than those at most colleges and universities, we share a similar dedication to bring together our unique talents, rooted in disciplinary expertise and professional habits and grounded in cutting-edge pedagogy, to provide an inclusive, quality education for our students.

Our faculty have a unique bond with our students that enables all of us to grow and learn together. I am thrilled that nearly 100 current and former faculty members have contributed to this volume, providing an opportunity to share their experiences and lessons learned with others engaged in the teaching enterprise. I hope that as a reader, you learn as much as I do from this talented group of individuals – individuals with whom I have the honor to serve and from whom I learn each and every day.

Outsmart Navy,
BG Cindy R. Jebb

Acknowledgments

The idea for this volume percolated in various corners of West Point for many years. We are incredibly grateful to Anna Clarkson for understanding and embracing our vision in its current form. We were lucky to host Anna at the United States Military Academy not long before the pandemic and look forward to welcoming her back into our classrooms again soon. Thank you to the broader Routledge team, especially to Will Bateman for his editorial assistance. The anonymous reviewers who gave their time to offer feedback on our prospectus helped focus this effort and helped to improve this product.

This volume represents the teaching experience and research of almost 100 authors and the diligence of approximately 50 reviewers, all of whom are recognized at the end of this volume. Not only did we enjoy working with this varied band of fellow pedagogues, we became better teachers in the process.

Jake is most thankful for the teamwork it took to turn this project into a reality. The professionalism and enthusiasm exhibited by the authors and the editors made it a true joy. He is also thankful for an incredibly supportive leadership team in his department and at West Point who inspire our faculty to achieve amazing results. Finally, he realizes just how blessed he is by his wife, Lesley, and three wonderful children – Elizabeth, Madalyn, and Andrew – who help him keep everything in perspective.

Morten has noticed that as we age, fewer people are directly impacted in the work-family spillover. No less, he wants to thank his wife Corina, a fellow teacher, who has been there his entire adult life and has tolerated his musings about the book publication process. He would also like to thank both his cat, Nick, and the DJs of WFUV.org – a commercial-free public radio station out of Fordham University, Bronx, New York – for keeping him company from morning through the night long before, during, and hopefully long after the 2020 pandemic.

Ray is grateful to have worked with such an amazing team of authors and editors on this project. He thanks his wife, Mindy, and son, Daniel, for understanding the power of the magic words "Dad's on deadline."

Rachel is still wondering how this group of editors and authors managed to work together to produce a book during a pandemic while moving all of West Point's academic courses online. She is honored to be a part of this team. She is beyond grateful for her amazing team at home, including Joe, Sasha, and Simon. Finally, she is thankful for four mentors who taught her to teach the West Point way, Cindy Jebb, Suzanne Nielsen, Mike Meese, and Ike Wilson.

Finally, we would like to thank the cadets – past, present, and future – of the United States Military Academy for consistently inspiring us to be the best versions of ourselves in the classroom and in life.

All this being said, know that the views expressed in this volume are those of the editors and authors and do not reflect the official policy or position of the U.S. Military Academy, the Department of the Army, the Department of Defense, or the U.S. Government.

Jakob C. Bruhl
Morten G. Ender
Raymond A. Kimball
Rachel M. Sondheimer
West Point, NY
September 11, 2020

Glossary of acronyms and military ranks

AAR	After Action Review
ABET	Accreditation Board for Engineering and Technology
AI	Artificial Intelligence or Additional Instruction
AIAD	Advanced Individual Academic Development
AME	African Methodist Episcopal
ANOVA	Analysis of Variance
APA	American Psychological Association
APSC	Academic Performance Score Cumulative
AT	Academic Terms
AY	Academic Year
CDR	Cadet Developmental Report
CEER	College Entrance Examination Rank
CEP	Center for Enhanced Performance
CGI	Computer-Generated Imagery
CIO	Chief Information Officer
CIT-E	Center for Infrastructure Transformation and Education
CITI	Collaborative Institutional Training Initiative
COIN	Counterinsurgency
COVID-19	2019 Novel Coronavirus
CQPA	Cumulative Quality Point Average
CR	Conditioned Response
CS	Conditioned Stimulus
CSC	Complementary Support Courses
CURE	Course-based Undergraduate Research Experience
DARPA	Defense Advanced Research Projects Agency
DCIP	Defense Critical Infrastructure Program
DHS	Department of Homeland Security
DLA	Discovery Learning Assessments
DLA	Discussion Leader Assignment
EDA	Exploratory Data Analysis
ELDP	Eisenhower Leadership Development Program
EM	Engineering Management
FCDT	Fourth Class Development Time
FEE	Fundamentals of Engineering Exam
FLICR	Faculty Learning, Innovation, Collaboration, and Research
FRG	Federal Republic of Germany

FRLM	Full Range Leadership Model
FYC	First-Year Composition
GAISE	Guidelines for Assessment and Instruction in Statistics Education
GDR	German Democratic Republic
GPA	Grade Point Average
HBS	Harvard Business School
HRPP	Human Research Protections Program
IGM	Intellectual Giant Model
IPR	In-Progress Review
IRB	Institutional Review Board
ISIS	Islamic State in Iraq and Syria
IT	Information Technology
IWARS	Infantry Warrior Simulation
JAIC	Joint Artificial Intelligence Center
KGB	Committee for State Security
LAW	Lethal Autonomous Weapon
LFS	Letter to the Future Self
LGBTQ+	Lesbian, Gay, Bisexual, Transgender, Queer and others
LSN	Lesson
MALDI-TOF-MS	Matrix-Assisted Laser Desorption/Ionization-Time-of-Flight-Mass Spectrometry
MAPS	Mathematics Attitudes and Perceptions Survey
MD-PhD	Medical Doctor – Doctor of Philosophy
MFM	Modified Family Monopoly
MIT	Massachusetts Institute of Technology
MOOTW	Military Operations Other Than War
MSE	Mathematics, Science, and Engineering
MTP	Master Teacher Program
NCAA	National Collegiate Athletic Association
NCO	Non-Commissioned Officer
NGO	Nongovernmental Organization
NS	Neutral Stimulus
NTU	Number of Transfer Units
NYC	New York City
OBT	"One Big Thing"
OCR	Operation Combined Resolve
OLS	Ordinary Least Squares
OML	Order of Merit List
OPD	Oral Presentation and Discussion
P&ID	Piping and Instrumentation Diagram
PC	Personal Computer
PDF	Portable Document Format
PDR	Periodic Development Reports
PER	Physics Education Research
PUSMA	Professor, U.S. Military Academy
SARAMIS	Spectral Archive And Microbial Identification System
SES	Socioeconomic Status
SHARP	Sexual Harassment/Assault Response and Prevention

SLE	Summer Leadership Experience
SOP	Standard Operating Procedure
STEM	Science, Technology, Engineering, and Mathematics
SWE	Signature Writing Event
TAC	Tactical Officer
TBL	Team-Based Learning
TEE	Term End Exam
TEM	Team Effectiveness Model
TFL	Transformational Leadership
TPS	Think – Pair – Share
TR	Technical Report
UCR	Unconditioned Response
UCS	Unconditioned Stimulus
URSA	Urban Reconnaissance through Supervised Autonomy
USAID	U.S. Agency for International Development
USMA	United States Military Academy
USSR	Union of Soviet Socialist Republics
VARK	Visual, Auditory, Reading/writing, and Kinesthetic
VIA	Values in Action Inventory
VUCA	Volatile, Uncertain, Complex, and Ambiguous
VWS	Vertical Writing Surface
WCS	Whole Candidate Score
WPLDS	West Point Leader Development System
WPR	Written Partial Review
WPWP	West Point Writing Program
WWII	World War II

United States Army

2LT – Second Lieutenant
1LT – First Lieutenant
CPT – Captain
MAJ – Major
LTC – Lieutenant Colonel
COL – Colonel
BG – Brigadier General
MG – Major General
LTG – Lieutenant General
GEN – General

Introduction

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Educating future Army leaders for a diverse and dynamic world

Various West Point authors[1]

The mission

The mission of West Point is to educate, train, and inspire the Corps of Cadets so that each graduate is a commissioned leader of character committed to the values of Duty, Honor, Country and prepared for a career of professional excellence and service to the nation as an officer in the United States Army. As members of the Academic Program at the United States Military Academy, we educate, train, and inspire the people who will one day lead our Army and our nation. The faculty and staff must be dedicated to building these leaders today, knowing that the return on this investment may come decades into the future. It is our responsibility to equip West Point graduates to respond well to any situation with character and strength. We help them build the intellectual capacity to be lifelong learners and to bring the pursuit of knowledge, truth, and reason to their life's work, both inside the Army and beyond. If we root them firmly in these traits, there is no limit to how far they can grow.

The United States Military Academy challenges cadets with a broad base of structured, rigorous, and developmental experiences across the academic, military, physical, and character programs to shape self-aware, confident, humble, and principled leaders. These four programs and their associated experiences are elements of the West Point Leader Development System (WPLDS). The dean of the Academic Board is responsible for ensuring that the Academic Program contributes to the achievement of WPLDS through the academic curriculum and associated activities, and for providing the necessary knowledge, skills, and attributes that future officers should have as they begin their careers as second lieutenants.

The faculty

USMA's exclusive mission requires a unique faculty committed to developing young leaders. Faculty at USMA are multifaceted. We are teachers, role models, mentors,

1 Many portions of this introduction are adopted from *Educating Army Leaders: Developing Intellect and Character to Navigate a Diverse and Dynamic World* (Office of the Dean, United States Military Academy, West Point, NY, 2020). Christopher Barth, Jean Blair, Katie Daily, Morten G. Ender, Mark Evans, Cindy Jebb, Rebecca Jones-Kellogg, Tim Judd, Melinda Kalainoff, Raymond A. Kimball, Brent Matthews, Christopher Mayer, Lynnan Mocek, Rachel M. Sondheimer, and Ken Wickiser. Many thanks from these contributors wishing to express their deepest appreciation to all those who provided assistance and offered feedback through committees, working groups, and other means.

institutional leaders, national and international known scholars, leaders in our respective professional societies, and caring, engaged members of the community. USMA faculty developed a bionic foot to change the lives of our wounded warriors;[2] others conducted groundbreaking research in the field of combating terrorism;[3] others partner with colleagues at other military academies to better understand and eradicate sexual assault and harassment;[4] some poetically bash stereotypes about soldiers and literature;[5] and others champion diversity and inclusion.[6] The faculty's broad range of research pursuits creates a rich and engaging learning environment for faculty and cadets.

The USMA faculty model is deliberately designed to include individuals with varying career paths to meet the needs of our mission. A combination of full-time military and civilian faculty members make up the core of this blend of excellence. With advanced degrees from an array of academic institutions including, but not limited to, Harvard, Princeton, Yale, Stanford, MIT, Maryland, Oxford, and Cambridge, the faculty are united as exceptional educators dedicated to developing critical and independent thinkers who will succeed as Army officers. Approximately 18% of our faculty are senior military, 55% are junior military, and 27% are civilians (tenure and nontenure track; junior and senior). This blend of backgrounds is valued for providing diverse expertise and perspective to collectively accomplish our mission. Our military faculty are carefully selected from across the Army, and our civilian faculty are recruited through nationally competitive searches. Our most senior military faculty – designated Professors, United States Military Academy (PUSMAs) – are nominated by the President of the United States and confirmed by the United States Senate.

Our senior faculty includes a blend of military officers and civilians who have achieved the position of Professor, USMA; Academy Professor; and/or the academic ranks of Associate Professor or Professor (with tenure) in their respective disciplines. Senior faculty members offer academic expertise and provide continuity to the curriculum because of their experience, education, and tenure. Our military faculty members bring careers of leadership experience in the operational Army, and our civilian faculty members provide strong connections to higher education and other areas of society. All senior faculty members are expert educators who understand pedagogy, curriculum design, course design, and best practices in assessment. They are responsible for establishing the intellectual foundation for service as a commissioned officer and fostering development in leadership, moral courage, and integrity essential to such service. They lead our academic programs, oversee the curriculum, and share in the governance of the institution. They are accomplished scholars who are actively engaged in research and other activities that advance their disciplines' bodies of knowledge and provide valuable intellectual expertise

2 Joseph Hitt, James Merlo, Jonathan Johnston, Matthew Holgate, Alex Boehler, Kevin Hollander, and Thomas Sugar. *Bionic Running for Unilateral Transtibial Military Amputees*. A presentation at the 27th Army Science Conference (ASC), Orlando, FL (November 29–December 2, 2010).

3 James J. F. Forest. *Terrorism and Counterterrorism: An Annotated Bibliography* (West Point, NY: Combatting Terrorism Center, 2004). Available online at: www.teachingterror.org/bibliography/CTC_Bibliography_2004.pdf.

4 Marjorie H. Carroll, Lisa M. Korenman, and Judith E. Rosenstein. "Does Sex of the Victim Matter? A Comparison of Rape Scripts involving a Male or Female Victim. *Violence and Gender*, 6 (2019): 175–186. https://doi.org/10.1089/vio.2018.0040.

5 Elizabeth D. Samet. *Soldier's Heart: Reading Literature Through Peace and War at West Point* (Farrar, Straus and Giroux, 2007).

6 David E. Rohall, Morten G. Ender, and Michael D. Matthews (eds.). *Inclusion in the U.S Military: A Force for Diversity* (Lexington Books, 2017).

to our Army and the nation. They are responsible for mentoring and developing junior faculty both academically and professionally.

The junior faculty is the largest group of faculty members at USMA. The junior military faculty is largely comprised of active duty captains and majors who usually teach at USMA for three years as a broadening opportunity. The goal of these assignments is to provide junior officers with exposure to different environments to gain new perspectives and to grapple with complex problems. These junior rotators arrive to West Point having just completed advanced degrees in their respective fields and will move back out to the operational Army following their "tour" here. Junior civilian faculty members come to USMA early in their academic careers after earning a PhD or equivalent training in their respective fields and assume tenure or nontenure track posts. Because they are usually fresh out of graduate school, the junior faculty are imbued with the latest pedagogical practices and cutting-edge research. Given their recent field experiences in the operational Army, our junior rotating military officers are particularly important role models and mentors for the cadets. Our junior civilian faculty also serve as key role models, providing depth of discipline and real-world experience in the classroom. Some of the most lasting bonds that we see at USMA form among our junior faculty. Rotating military faculty often act as guides for new civilians as they experience military culture for the first time. Civilian faculty, usually fresh from earning their PhDs or from other respected institutions, are vital resources for junior military faculty who seek mentorship on research, teaching, and navigating the world of academia. Their promotion and tenure closely follow those at traditional institutions.

We often refer to our junior military faculty affectionately as USMA's "second graduating class" following the graduating cadets. During their time here, this group develops additional skills, knowledge, and experience that empower their continued service in the Army and in the academic community. Aided by continual mentorship from senior faculty, our goal is for the junior faculty to use their graduate education and experiences teaching at USMA to grow into the next generation of senior leaders for the Army, for higher education, and for the nation.

The emphasis on cadet mentorship is one of the defining characteristics of the USMA faculty. These professional mentoring relationships begin in the classroom. We maintain small class sizes and have a low (7:1) student-to-instructor ratio. Small classes facilitate an engaging formal learning environment with no more than 18 cadets, filled with dynamic discussions, small group work, and in-person visits to meet with and observe key leaders in a given field. West Point is consistently rated in the Princeton Review for the most accessible faculty across the nation.[7] The low student-to-instructor ratio also provides faculty members the bandwidth to forge meaningful relationships with cadets in their classes and to meet with cadets for additional help as needed.

Interactions between faculty and cadets are not confined to the classroom. All USMA faculty are encouraged to become involved in other aspects of the cadet experience. A visitor to USMA will see faculty conversing with cadets in individualized instruction, visiting team practices, and mentoring our highly competitive NCAA and club athletic teams, as well as providing leadership to our student interest clubs. USMA faculty also contribute to the holistic development of cadets when they host cadets in their homes as sponsor families and role models, providing an understanding of life in an Army (or

7 See www.princetonreview.com/college-rankings?rankings=most-accessible-professors.

civilian professional) family. In partnership with USMA's tactical officers[8] and coaches, faculty members provide cadets diverse forms of focused mentorship. The development of our faculty is a commitment and a necessity. We provide a hub for faculty learning, innovation, collaboration, and research (FLICR) including interdepartmental and external development.

The academic staff serve alongside our faculty and are dedicated to providing foundational and enriching academic experiences. From classroom and laboratory support to the provision of core academic and administrative services, staff are committed to excellence and professionalism in mission success. Because many members of the academic staff serve at USMA in extended appointments or tenured civilian positions, they are critical to the stability and continuity of our academic operations.

The cadets

The United States Corps of Cadets brings together a diverse set of approximately 4,529 young men and women from all over the world united in their desire to be the Army's next generation of leaders.[9] Admission to USMA is highly selective, drawing from an extremely talented pool of applicants who likely had many options for their higher education. Our cadets chose a path that is less chosen. Our cadets tend to be confident, focused, and hard-working. They are motivated by our faculty, by each other, and by the ideals of service to the nation. They believe they can make the world a better place and are willing to make personal sacrifices to achieve that end.

The diversity of the Corps of Cadets is a strength. Cadets come to USMA for a variety of reasons and have vastly different experiences from which to draw as they set out together on their 47-month (four-year) journey. Some cadets graduated from high schools with thousands of students, while others were homeschooled. Some grew up in urban environments, while others have never visited a large city. Some were raised in relative comfort, while others have faced home evictions and food insecurity. Some are from as far away as Hawaii and Alaska (or foreign countries) while others are from New York City. Some have rich experiences growing up military or serving a time in the enlisted ranks while others have neither experience.

Cadets must be able-bodied with rigorous physical requirements for admission, and they are young relative to their civilian university peers – approximately 79% are 22 years of age or younger.[10] Moreover, cadets from the West Point graduating classes of 2020–2023 represent a multitude of religions, including Muslims, Hindus, agnostics, and atheists; races (1% American Indian or Alaskan Native; 8.5% Asian; 14.3% Black or African-American; 7% Hispanic; and 2% unknown or other); ethnicities (19 different

8 Tactical officers are the first-line legal guardians of the cadets. There are 32 tactical officers for each of the 32 cadet companies. Their offices are conjoined in the barracks of West Point where all cadets reside. All cadets reside on campus.

9 In March 2020, West Point hosted 66 foreign national and exchange cadets. Foreign nationals might include Chilean, Afghan, Iraqi, or Cameroonian cadets, among others. Typically, exchange cadets come from other military academies in the United States who remain at West Point for one semester. The former may attend for six weeks or more or remain at West Point for the entire four-year experience and graduate.

10 Applicants must be between 17 and not yet 23 years of age on July 1 of their year of admission. There are exceptions to this policy. No cadet including foreign nationals is over 30 as of April 2020.

ethnicities including 4% Korean-American and 3.5% Mexican-American); and social classes,[11] with cadets recognized on the LGBTQ+ spectrum; and a rising proportion of women since 1980, at 23% women today. Despite these differences, our cadets have arrived at the same place, USMA. They have exhibited a desire to serve something larger than themselves, a drive to be challenged, and a commitment to become leaders of character in the United States Army.

The USMA classroom experience reflects the diversity of the Corps of Cadets. Faculty must harness the opportunities afforded from these different skills and backgrounds. Faculty will encounter cadets at various stages of intellectual, emotional, and character development. Our focus on teaching individual cadets in small settings allows us to understand their personal level of development and to help cadets realize their own potential.

The academic curriculum

At the United States Military Academy, the term "curriculum" encompasses more than traditional academics. The 47-month experience includes military, physical, and character development through required and voluntary courses, extracurricular activities, and other events. Every interaction with faculty, staff, tactical teams, coaches, and other mentors helps to model and reinforce the roles and relationships, norms and standards, and responsibilities and obligations that we expect from a future Army officer. From this institutional perspective, every interaction is a leader development event to build leaders of character. Moving beyond this holistic approach to focus on the academic pillar, the academic curriculum consists of 40 academic courses, including the core curriculum and typically 13 courses for a selected major, required to earn an undergraduate degree (double majors, minors, and honors in the major are optional to high performing cadets).

USMA's overarching academic goal holds that graduates integrate knowledge and skills from a variety of disciplines to anticipate and respond appropriately to opportunities and challenges in a changing world. The core curriculum is the hallmark of the academic curriculum and is central to the Academic Program and the goal. Spanning science, math, engineering, language, the humanities, and the social sciences, the core courses, in conjunction with the academic major, constitute the necessary elements of a liberal education. This suite of courses seeks to provide a broad foundation that teaches cadets how to think about problems in varied and adaptive ways as they learn to navigate and succeed in an increasingly complex world.

The academic core curriculum usually consists of 24–27 courses (depending on the major) selected to collectively broaden and build a cadet's repertoire of disciplinary perspectives to better engage with the world. A core course introduces students to disciplinary content and to each discipline's methods of inquiry. The core curriculum provides cadets with various ways of thinking and highlights myriad ways to interpret phenomena and approach problems. This breadth encourages cadets to make informed judgments on an argument's validity and to distinguish that evaluation from opinion.

11 See John P. Hammill, David R. Segal, and Mady Wechsler Segal. "Self-Selection and Parental Socioeconomic Status as Determinants of the Values of West Point Cadets." *Armed Forces & Society*, 22, no. 1 (1995): 109.

Although most core courses are required as a common broadening experience, cadets have some options from which to choose (limited by course availability) in science, language, and engineering:

- In science, cadets build upon introductory courses in physics and chemistry with a higher-level course of their choice (to include biology) that extends application of the scientific method and emphasizes scientific writing.
- To fulfill the two-course language requirement, cadets choose among eight languages, such as Arabic or Russian. Cadets rank their preferences and are assigned to their courses based on their preference, aptitude in the language, and course availability.
- For the core engineering three-course sequence for nonengineering majors, cadets specify their preferences among six engineering sequences such as nuclear or mechanical and are placed based on their preferences and availability.

A focus on disciplinary depth in a chosen area complements the strong foundation laid by the core curriculum. Cadets select and complete at least one academic major with a minimum of 13 courses. In general, an academic major at USMA comprises three parts. The study-in-depth component is the foundation for the major and consists of a minimum of nine courses. Some of these courses may be required of all majors, while others are electives based on cadet interest. The second part of every major is a collection of three Complementary Support Courses (CSCs). CSCs can offer alternate viewpoints or modes of thought, intellectual exploration, other opportunities depending on the major and individual cadet, and additional courses required for the major. An integrative experience is the final piece of each major. The integrative experience consists of one or more courses designed to synthesize knowledge and skills developed throughout the core and major programs.

Many cadets who wish to pursue their studies beyond a single academic major opt to complete a minor in another field. A minor consists of a minimum of five academic courses of three credit hours or higher as determined by the program. To pursue both a major and a minor, a cadet must meet all curricular requirements for programs. Minors include Diversity & Inclusion Studies, Terrorism Studies, and Statistics, among others.

The core curriculum provides disciplinary breadth and the majors provide disciplinary depth, but there are other themes that bind the Academic Program and intellectual pursuits that bridge various courses. Integrative curricular components are explicit efforts to highlight certain linkages across disciplines. A sequence is a series of specific courses designed around a disciplinary topic, while a thread follows a broad subject across many disciplines. Sequences and threads foster integrative connections across core courses and bring together knowledge and skills from multiple disciplines. A capstone course serves as the integrative experience of an overall academic program. Every core course pertains to a *sequence*:

- *Mathematics, Science and Engineering (MSE) sequence*: The MSE sequence provides each cadet with a fundamental knowledge of the experimental and analytic techniques of the basic sciences: two semesters of mathematics, one semester of chemistry, one semester of physical geography, one semester of statistics, and an additional science course that cadets select based on their major and their interests. The engineering courses are identified by their core engineering sequence and are embedded within the appropriate engineering major or are generally taken in the second- and first-class years for nonengineering majors (see Chapter 21).

- *Core Engineering sequences*: Nonengineering majors complete a three-course core engineering sequence that complements their academic major and interests. Cadets choose among cyber engineering, electrical engineering, environmental engineering, infrastructure engineering, nuclear engineering, and systems engineering sequences.
- *Information Technology/Cyber sequence*: The IT/CYBER sequence is designed to ensure that every graduate is comfortable with and capable of securely using computers and information technology in an Army that must fight and win within an overarching cyber domain.
- *The Social/Behavioral Sciences and Humanities sequence*: In order to develop an awareness of the people, government, and society that the commissioned officer will serve, cadets are provided a strong sequence of courses from social sciences, behavioral sciences, and humanities. Cadets take one semester each of history (either US or regional), a history course on the Army of the Republic, literature, psychology, political science, philosophy, economics, international relations, military leadership, military history, and constitutional and military law (see Chapters 1; 9; 15; 19; 20; and 26).
- *Foreign Language sequences*: All cadets in this two-course foreign language sequence develop an introductory level of proficiency in one of eight languages, learn about other cultures and perspectives, and develop strategies for future language learning (see Chapters 13; 22; 24; and 29).

Threads provide the opportunity for courses from multiple disciplines, to include physical education, to explore similar concepts within the core program, often providing complementary yet distinct perspectives on shared themes. Many core courses are involved in threads and some in more than one.

- *Study of War (SoW) thread*: The SoW thread is a multidisciplinary effort that fosters cadets' intellectual understanding of war as a human phenomenon. This knowledge increases the effectiveness of platoon and company operations; enhances officers' understanding of the strategic, technical, and moral context of warfare; and provides a foundation for lifelong learning for the academy's graduates throughout their lives as military professionals.
- *The Human Condition thread* focuses on the inherently diverse human component of the Army. It emphasizes not only developing knowledge of oneself and an individual understanding of Army core values, but also an understanding of the "other," an understanding that comes from interacting with different cultures and perspectives. The thread encourages cadets to shift perspective and interpret the meaning and effects of diverse individual, organizational, and regional cultures. From basic courses on geography, history, and foreign language to courses on organizational and military culture to explicit alignment with the Army's Sexual Harassment Assault Response Prevention (SHARP) and diversity, equity, and inclusion initiatives, this thread leverages the inherent synergies across several academic disciplines in order to develop broader cross-cultural competence, build empathy toward others, and improve the ability to lead diverse organizations.
- *West Point Writing Program (WPWP)*: The WPWP works across the curriculum to provide cadets and faculty with continuity, depth, and coherence in their study of composition, critical thinking, academic argument, writing pedagogy,

and professional communication. More than 40 courses contribute to the program, each observing specific pedagogical and curricular standards as well as designating an individually authored Signature Writing Event (SWE) for cadets to complete. Faculty and cadet work find further support in two key subcomponents of the WPWP, the Writing Fellows Program and Mounger Writing Center (see Chapter 25).

- *MX400 Officership Course*: MX400, also called the "Superintendent's Capstone Course," is the common integrative experience for the Academic Program and their experiences in the West Point Leader Development System. Through MX400, cadets integrate and synthesize much of what they learned during their time at USMA as they explore professional issues and security challenges in a rigorous intellectual environment. The culminating experience is the Integrative Challenge, which drives cadets to think critically, draw upon and examine their internalized character, and work with others to address a realistic, complex problem in a military scenario (see Chapter 6).

Projects Day is one of the highlights of the academic year at USMA. In late April or early May of each year, the academic community comes together with external sponsors, donors, and graduates to celebrate academic accomplishments. At locations around the academy, cadets from all departments and majors share their academic work with the broader community. Myriad forms of scholarly expression are represented as cadets offer demonstrations of integrative experiences, artistic performances, thesis defenses, presentations of independent research, and results (or pre-demonstrations) of external academic competitions.

Educating and inspiring cadets

The West Point curriculum is enriched with numerous support services to assist cadets. These include the USMA Library, academic centers, internships, and study abroad programs, among others. Bringing the curriculum to life requires knowledgeable and committed faculty. While institutional and academic frameworks provide opportunities for an academic program to thrive, success depends upon the intentional cadet–faculty interactions that occur on a daily basis. Whether in one-on-one settings, small groups, in the classroom, or online in remote environments, the passions of our faculty for their teaching and for their disciplines are essential to ensuring success in our mission to educate future Army leaders.

Faculty prepare the minds of cadets to engage with the world as Army officers in ways that are consistent with disciplinary perspectives, institutional goals, and Army values. As such, the faculty have two main and interdependent roles: an institutional role and a disciplinary role.

Institutionally, every faculty member has a responsibility to be a role model and mentor or coach who guides cadets through opportunities for learning in and out of the classroom. Additionally, faculty are integral to cadets learning an academic discipline. Disciplinary knowledge is not just a set of facts to be memorized but a perspective or way of thinking that is added to a cadet's repertoire, building capacity for interpreting and acting in a complex and ever-changing environment. The most beneficial experiences foster integration across disciplines because they broaden and deepen perspectives and reinforce the interconnectedness in our world.

Some say that teaching is a performance art, but there is a science to it as well. Teaching is an intentional act that should be rooted in contemporary understandings of learning and knowledge acquisition. Indeed, this volume is evidence of the science of teaching and

learning. Throughout its history, USMA has developed and retained powerful teaching methods, most notably the Thayer Method (described more in the following).[12] Recent advances in our understanding of how individuals grow and develop over a lifetime must also inform how we prepare and deliver content. As our understanding of pedagogy evolves and we embrace and experiment with new pedagogical techniques, we should not lose sight of our historical focus on small classes, close faculty interaction, and sharp attention to cadet learning.

In a letter to President James Monroe dated 1828, then-West Point Superintendent Sylvanus Thayer described a teaching method employed at USMA and inspired by his observations at the École Polytechnique while on an extensive tour of European universities. According to Thayer, large classes were lectured by a professor and subsequently divided into sections of 20 or fewer cadets where each cadet "should demonstrate a proposition or explain an investigation at the Black-board and be interrogated to see that he thoroughly understands the principles." These smaller sections were run by assistant professors or upper-class cadets, with the professor as overseer, visiting each section in turn. Each cadet was expected to demonstrate mastery of material, which included a high degree of recitation of memorized material as well as demonstration of "a proposition or explain an investigation . . . and be interrogated to see that he thoroughly understands the principles." His insistence that cadets progress to new levels of material only after they had mastered the previous levels predated the now common method of mastery learning and created a rigorous learning environment for classes of cadets that varied widely in their preparation for higher education studies. Cadets were graded on nearly every lesson and seated according to their level of performance, thus emphasizing the importance of performance and raising the level of academic rigor and expectations. Sylvanus Thayer is credited with turning the U.S. Military Academy into a rigorous educational institution through his teaching method, formal academic curriculum, military experiences, character development, and discipline structure, known collectively as the Thayer System.

Some of the hallmarks of this Thayer Method of teaching – small classes, cadet preparation prior to class, minimal lecturing, and cadet briefings and board work – have endured to the present, with many departmental variations reflecting disciplinary differences and advances in higher education practices. For example, higher educational professionals have shown that mastery of material includes higher levels of cognitive functioning such as analysis, synthesis, and evaluation rather than memorization. In adapting the Thayer Method to these widely accepted practices, the daily recitations of extensive memorized material have evolved into application of concepts to real-life situations. Current higher education practices also recognize the value of students actively working with course material rather than passively attending lectures as the sole instructional strategy, thus validating Thayer's focus on cadet in-class demonstrations of mastery.

As his legacy continues to inspire the structure and methods for educating leaders at USMA, we recognize that tradition alone is insufficient justification for continued practices that may not be as effective or relevant today. Nothing exemplifies this more than the movement over the years from the completely proscribed engineering curriculum of the Thayer System to our current broad liberal education required to prepare the minds of cadets to engage with a complex and ever-changing world.

12 Nardi Reeder Campion. "Who Was Sylvanus Thayer?" *Dartmouth Engineer Magazine* (Fall 2004). Available online at: https://engineering.dartmouth.edu/magazine/who-was-sylvanus-thayer.

How we do it

The remainder of this volume is dedicated to how we prepare our cadets for the challenges they will face as individuals, officers, professionals, and citizens in our democracy. We bring the reader some of the best practices in our unique environment. The volume is separated into five sections: (1) course syllabi; (2) assignments; (3) teaching and learning notes; (4) uni-disciplinary empirical studies; and (5) interdisciplinary empirical studies. The syllabi and assignments sections are written in a way that allows professors in that discipline to easily incorporate the full course or lesser modules or lessons into their own teaching.

The 14 teaching and learning notes included here provide empirical evidence supporting various in and out-of-class activities. The chapters cover a range of disciplines from foreign language to physics to sociology. They are intended for practicing academics to easily adopt the course or activity to their existing course or to perhaps replicate the study at their own campus.

The uni-disciplinary empirical studies are full-length empirical studies that cover teaching techniques in a wide array of individual disciplines, including a literature review supporting the pedagogy in question.

Interdisciplinary studies follow the same format but blend two or more disciplines into a cohesive whole.

It is our hope that these tools and techniques will inspire the same levels of creativity and understanding in other undergraduate institutions as they have for us.

Syllabi

Raymond A. Kimball

This section features six syllabi currently in use at West Point. The intent of this section is to provide living documents that showcase unique courses or approaches that can be of benefit to scholars at other institutions. All syllabi in this section have been carefully abbreviated to reflect the core ideas and elements of the course. Full syllabi for many of these courses are available in the website companion to this book. This section contains syllabi from the fields of leadership, civil engineering, sociology, chemical engineering, management, and our capstone professional development course.

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1 Military leadership

Purpose, direction, motivation

Russell P. Lemler and Jordon E. Swain

Course purpose

This course does not provide students with "the right answers" to be better leaders, but challenges them to integrate their developmental experiences with new knowledge and reflection to lead more effectively in a complex world. The course has three main goals:

1 *Cadets learn to apply knowledge from the behavioral, organizational, and sociological sciences to understand, explain, predict, and influence human behavior in organizations*. Students who complete this course demonstrate the ability to apply a broad array of scientific knowledge to specific leadership situations, enabling them to better understand what is happening around them, explain it to other people, make reasonable predictions about expected outcomes, and take actions intended to improve performance while enhancing their organization.
2 *Cadets will reflect on their leadership and become better, more self-aware leaders*. Self-awareness is critical to being a leader of character. Students will leave this course with a better sense of who they are, their strengths, weaknesses, values, and purpose, as well as their biases and tendencies. In this way, students will have become better, more self-aware leaders.
3 *Cadets will be inspired to own their own development and to pursue lifelong learning in topics pertaining to leadership and organizational effectiveness*. Students who complete this course leave having realized the incredible breadth and depth of knowledge accessible but not yet known to them. They demonstrate curiosity, seeking to gain additional knowledge and apply it as leaders of character, throughout a career of professional excellence and service to the nation.

Lesson preparation

All assigned readings are drawn from the textbook *West Point Leadership* published by Rowan Technologies. These readings stem from current research and are designed for students focused on becoming better leaders. To assist in lesson preparation, this course guide contains learning objectives for each lesson that cadets should use to guide and focus effort.

Course performance

Performance in this course will be determined through the following graded events and lesson structure. (Tables 1.1 and 1.2):

Table 1.1 Graded Events

LEADER DEVELOPMENT PORTFOLIO	400 total points
Journey Line Paper (JL)	(175 points)
Leader Self-Assessment (LSA)	(25 points)
Leader Philosophy Paper (LPP)	(200 points)
MIDTERM EXAM	200 points
FINAL EXAM	300 points
INSTRUCTOR POINTS	100 points
TOTAL	1,000 points

Table 1.2 Lesson structure

Lesson	*Topic*	*Graded Assignment*
Block 1: Preparing Yourself to Lead		
1	Introduction	
2	Leader Development	
3	Character and Its Development	
4	Authentic Leadership	
5	Perceptions and Biases	
6	Decision Making	
7	Resilience	Journey Line
8	Emotional Intelligence	
9	Block 1 Case Study	
Block 2: Leading Others		
10	Cross-Cultural Competence	
11	Developmental Communication	
12	Motivation (Theories)	
13	Motivation (Goal Setting)	
14	Power & Influence	
15	Power & Character	
16	Transformational Leadership	
17	Toxic Leadership	Leader Self-Assessment
18	Block 2 Case Study	
19	Mid-Term Exam	Exam
20	Guest Speaker	
Block 3: Leading Teams		
21	Principled Negotiation	
22	Team Dynamics and Effectiveness	
23	Developing Cohesive Teams	
24	Managing Conflict	
25	Organizational Justice	
26	Organizational Culture & Change	
27	Socialization	Leader Philosophy Paper
28	Block 3 Case Study	
29	*In Extremis* Leadership	
30	Course Wrap-Up/Exam Review	Exam

You will complete three writing assignments as part of your Leader Development Portfolio. The course is designed in three modules that build upon each other from micro to macro. The writing assignments also build on each other, from the past to the future. The Journey Line paper asks you to reflect on your life experiences and clearly, concisely, and compellingly answer the question "Who am I?" You will solidify in your own mind some of your core values and improve your self-awareness, putting you on the path to becoming a more authentic and effective leader. The second writing assignment, the Leader Self-Assessment, asks you to answer "Where am I now?" You will produce a document demonstrating meaningful reflection and increased self-awareness about your competencies and attributes as a leader. The final writing assignment, the Leader Philosophy Paper, asks you to clearly, concisely, and compellingly answer the question "How will I lead?" After reading this document, people will know what to expect from you as a leader; they will be convinced that your personal beliefs about leadership are not only important to you but that they have veracity.

Lesson 1: Introduction

1 *Summarize* the purpose and goals of PL300.
2 *Describe* how PL300 will fit into your personal development.
3 *Describe* the selection and use of a PL300 mentor.
4 *Understand* course assignments, assessment, and lesson sequence.

Lesson Reading: Course Guide

Lesson 2: Leader Development

1 *Define* the concept of leadership.
2 *Explain* how aspects of genetic inheritance interact with environmental factors.
3 *Apply* the Leader Development Model to develop yourself and others as leaders, and make your organization more effective.

Lesson Reading: Forsythe, G. B. & Spencer, E. H. (2018).

Lesson 3: Character and Its Development

1 *Define* "character."
2 *Describe* the different character strengths and virtues.
3 *Explain* what scientists have learned about the way character strengths develop.
4 *Apply* knowledge of character and its development to be/become a better leader, develop others as leaders, and make your organization more effective.

Lesson Reading: Matthews, M. D. & Lerner, R. M. (2018).

Lesson 4: Authentic Leadership

1 *Differentiate* between authenticity and authentic leadership.
2 *Summarize* the factors that influence authenticity and authentic leadership.
3 *Evaluate* the argument that authentic leadership positively impacts leaders' effectiveness.
4 *Apply* the authors' ideas to develop yourself and others as leaders.

Lesson Reading: Sweeney, P. J. & Soltwisch, B. R. (2018).

Lesson 5: Perceptions and Biases

1 *Explain* how perceptual processes, attribution errors, and biases influence how we see others and the environment/situation.
2 *Explain* how the elements of self-concept influence our behavior and well-being.
3 *Apply* knowledge of perceptions and biases to improve the accuracy of perceptions, develop a global mindset, and increase self-awareness in yourself and others.

Lesson Reading: Foster, C. & Dobbs, J. (2018).

Lesson 6: Decision Making

1 *Differentiate* between rational and naturalistic decision making.
2 *Discuss* ethical decision making considerations and their pragmatic application.
3 *Apply* knowledge of decision making to better prepare for and make important decisions, enabling you to lead more ethically and effectively.

Lesson Reading: Shattuck, L., Rowan, C. & Bell, B. (2018).

Lesson 7: Resilience

1 *Analyze* the role of failure, adversity, and resilience in leader (human) development.
2 *Apply* the Strength Model of Resilience to understand, explain, and promote resilience.
3 *Apply* knowledge of resilience to enhance your own resilience and development as a leader, as well as that of others.

Lesson Reading: Brazil, D. & Dunham, Y. G. (2018).

Lesson 8: Emotional Intelligence

1 *Discuss* the two major conceptualizations of emotional intelligence.
2 *Summarize* the common ground core concepts of emotional intelligence.
3 *Evaluate* the argument that emotional intelligence impacts leader effectiveness.
4 *Apply* your knowledge of emotional intelligence to develop yourself and others.

Lesson Reading: Lin, E. X. & Britt, K. P. & (2018).

Lesson 9: Block 1 Case Study

General Patton and Lieutenant Winters: a Contrast in Leadership Swain, J., & Young, L., available at: https://doi.org/10.1108/TCJ-02-2018-0033. Alternate case study: students compare HBS cases *Coach K: A Matter of the Heart* and *Coach Knight: The Will to Win*.

Lesson 10: Cross-Cultural Competence

1 *Define* cross-cultural competence (3C) and *summarize* its components.
2 *Explain* how 3C enables organizations to be more effective when they operate in (or with people from) foreign cultures.
3 *Explain* how 3C enables organizations to sustain and improve internal team dynamics, cohesion, and organizational effectiveness.

Lesson Reading: Hajjar, R. M. (2018).

Lesson 11: Developmental Communication

1 *Summarize* the essential characteristics of positive developmental communication.
2 *Explain* the counseling process, basic counseling skills, and their impact on communication.
3 *Apply* knowledge of counseling to better lead and develop others.

Lesson Reading: Caffarel, D. P., & Carter, R. T., (2018).

Lesson 12: Motivation (Content, Situational, & Process Theories)

1 *Explain* differences in individuals' motivation and behavior as a function of the common biological, social, and psychological forces experienced by people.
2 *Apply* knowledge of motivation to diagnose when you are facing a motivation problem versus when you are confronting some other kind of issue.
3 *Discuss* major content, situational, and process theories of work motivation.
4 *Apply* theories of work motivation to enhance performance in yourself and others.

Lesson Reading: Kanfer, R. & Cornwell, J. F. (2018) and Kanfer, R. & Ryan, D. M. (2018).

Lesson 13: Motivation (Goal Setting)

1 *Explain* how goals impact motivation and performance.
2 *Apply* goal setting theory to motivate yourself and others.
3 *Apply* knowledge of goal setting to avoid common goal setting pitfalls.
4 *Apply* knowledge of goal setting to be or become a leader of character.

Lesson Reading: Locke, E. A. & Smith, D. R. (2018).

Lesson 14: Power & Influence

1 *Analyze* the six different sources (bases) of power.
2 *Differentiate* among common influence tactics used and among the outcomes that might be attained when leaders attempt to influence others.
3 *Apply* knowledge of power and influence to obtain desired outcomes.
4 *Apply* knowledge of power and influence to become a more powerful, influential leader.

Lesson Reading: Overbeck, J. R. & Page, K. E. (2018).

Lesson 15: Power & Character

1 *Explain* how power can impact the way leaders think, feel, and behave.
2 *Explain* how power differentials (i.e., hierarchy) impact human social interaction and relationships in organizations.
3 *Describe* how power both challenges and reveals character in leaders.
4 *Apply* knowledge of power and influence to become a more powerful, influential leader.

Lesson Reading: Overbeck, J. R. & Page, K. E. (2018).

Lesson 16: Transformational Leadership (TFL)

1 *Summarize* the Full Range Leadership Model (FRLM) and transformational leadership.
2 *Differentiate* between the leadership styles and types described by the FRLM.
3 *Explain* the relationships between conditions, behaviors, processes, and outcomes.
4 *Apply* knowledge of the FRLM and TFL to become a better leader, develop better leaders, and make your organization more effective.

Lesson Reading: Banks, B. B. (2018).

Lesson 17: Toxic Leadership

1 *Summarize* the attributes and behaviors commonly observed among toxic leaders.
2 *Apply* knowledge of the toxic triangle to *explain* how toxic leaders rise to power.
3 *Apply* knowledge of toxic leadership to counteract and mitigate its impacts.
4 *Synthesize* knowledge of toxic leadership to be a better leader.

Lesson Reading: Eljdid, A. &. Lovelace, J. B (2018).

Lesson 18: Block 2 Case Study

Office Space: a Leadership Challenge Swain, J., Tuite, J., & Borland, J. available at: https://doi.org/10.1108/TCJ-02-2018-0032. Alternate case study: HBS case *Fire at Mann Gulch*.

Lesson 19: Midterm Exam

Lesson 20: Evening Lecture/Guest Speaker

Lesson 21: Principled Negotiation

1 *Explain* how preconceived notions of success impact negotiation processes and results.
2 *Differentiate* between "principled negotiation" and "positional bargaining."
3 *Apply* the seven elements of principled negotiation to prepare for and conduct a negotiation.
4 Apply knowledge of negotiations to become a better leader.

Lesson Reading: Weiss, J., Donigian, A. & Rybacki, M. (2018).

Lesson 22: Team Dynamics & Effectiveness

1 *Define* organizational (team) effectiveness.
2 *Apply* knowledge of the components of team effectiveness to assess it.
3 *Summarize* the Team Effectiveness Model (TEM).
4 *Apply* knowledge of the TEM to understand, explain, and influence team effectiveness.

Lesson Reading: Smith, D. R. & Young, L. V. (2018).

Lesson 23: Developing Cohesive Teams

1 *Analyze* the sources of team cohesion and organizational effectiveness.
2 *Explain* the impact of team norms on cohesion and organizational (team) effectiveness.
3 *Explain* how each type of team interdependence affects team effectiveness.
4 *Apply* knowledge of team development and cohesion to create effective organizations.

Lesson Reading: Bullis, C. & Eslinger, N. (2018).

Lesson 24: Managing Conflict

1 *Apply* the Conflict Process Model to diagnose the sources of conflict in organizations.
2 *Apply* appropriate conflict handling styles (intentions).
3 *Apply* knowledge of conflict and its management to become a better leader.

Lesson Reading: Boroff, K. E. & Pratt, M. L. (2018).

Lesson 25: Organizational Justice

1 *Describe* organizational justice as a multidimensional construct.
2 *Explain* how perceptions of organizational justice relate to team effectiveness.
3 *Apply* knowledge of organizational justice to understand disparate perceptions of equity.
4 *Apply* knowledge of organizational justice to anticipate and influence justice perceptions.

Lesson Reading: Feinberg, K. R. & Smith, D. R. (2018).

Lessons 26: Organizational Culture and Change

1 *Apply* the four-phase Leading Change Framework to assess organizational culture.
2 *Apply* Schein's theory of organizational culture to identify the need for change.
3 *Apply* Kotter's eight steps to prepare for, lead, and anchor positive organizational change.
4 *Discuss* how leaders' character influences the process and outcomes of change.

Lesson Reading: Spain, E. S. P., LeBoeuf, J. N. G. & Cook, C. L. (2018).

Lesson 27: Socialization

1 *Identify* and *define* appropriate goals for organizational socialization.
2 *Explain* how socialization processes work (i.e., the three-phased model).
3 *Explain* how socialization processes differ (i.e., common socialization processes).
4 Purposefully *design* a socialization process to enhance organizational effectiveness.

Lesson Reading: Hannah, S., & Dawson, J. (2018).

Lesson 28: Block 3 Case Study

A Change for Drill Sergeants? Boroff, K., Lemler, R., & Boroff, A., available at: www.thecasecentre.org/programmeAdmin/products/view?id=150395. Alternate case study: HBS case *The Army Crew Team*.

Lesson 29: *In Extremis* Leadership

1 *Differentiate* between *in extremis* situations and more typical leadership contexts.
2 *Summarize* the characteristics of effective *in extremis* leadership.
3 *Apply* knowledge of *in extremis* leadership to become a better leader.

Lesson Reading: Kolditz, T. A., Mcdonald, T. J., & Smith, D. R. (2018).

Lesson 30: Course Wrap-up/Prepare for Final Exam

2 Infrastructure engineering

Appreciating the art and science of our built environment

J. Ledlie Klosky and Brian Riser

The birth of an infrastructure survey course – lessons from Iraq and Afghanistan

It could be argued that a more-than-rudimentary knowledge of infrastructure operation, especially of water, energy, and communication, is necessary to contribute fully to discussions of important issues such as social justice, sustainability, security and peace, and international relations. Much as we correctly ask that an engineer understand the essence of art and literature to claim a college degree, it could also be said that a graduate of humanities programs must understand the world we have built in order to make that same claim. This course, infrastructure engineering, seeks to make that possible by providing a coherent framework for that understanding and providing in-depth experiences and instruction supporting the use of that framework across a few key infrastructure sectors.

Beyond this generality, the Army and nation have a strong need for this broad understanding. This took on urgency in 2009 when the Special Inspector General for Iraq Reconstruction made clear that reconstruction efforts in Iraq were failing to deliver on their promise.[1] Billions had already been spent and were still to be spent, but issues including security, course-changes, personnel turnover, and contracting and management problems as well as a lack of unity of command and effort persisted; these factors bogged down, stopped, or misaligned infrastructure efforts. Resources were wasted and both coalition and Iraqi citizen lives were lost to the chaos that ensued as security and nation-building efforts failed to bring about the desired stability. It was a very tough period for the nation of Iraq and the coalition personnel working to secure the peace. Of course, they say hindsight is 20/20, but that is what makes it worth looking to the past for lessons learned; it became clear that West Point must respond by better preparing officers to meet the challenge.[2] But beyond just the Army's needs, infrastructure is an essential element of modern life, and understanding infrastructure is critical to understanding the world in which we live.

1 Bowen, Stuart, "Hard Lessons – The Iraq Reconstruction Experience." Report of the Special Inspector General for Iraq Reconstruction, 2009; Bowen, Stuart, "Learning from Iraq – A Final Report of the Special Inspector General for Iraq Reconstruction." Report of the Special Inspector General for Iraq Reconstruction, 2013.

2 Meyer, Karl, Chris Conley, Scott Hamilton, Joseph Hanus, Stephen Hart, J. Ledlie Klosky, "A Global Curriculum to Support Civil Engineering in Developing Nations: The Final Result." In *Proc., ASEE National Conference,* ASEE, Washington, DC, 2010.

After considerable debate, data gathering, and consideration,[3] the Department of Civil and Mechanical Engineering at West Point set out to create an infrastructure course that would address the gap in Army capabilities and produce graduates ready to lead in the infrastructure space.[4] As this development took place, it was quickly realized that two essential elements were missing from our initial thinking. First, there was not a clear, defensible, and vetted theoretical framework for understanding, visualizing, and describing infrastructure systems. That framework was developed to support the course, and over the ensuing years was refined and widely published, especially including in TR 14–14 *Infrastructure and the Operational Art*,[5] which remains an important supporting text for the course. Second, the topic of infrastructure reaches far beyond the Army's needs – it is an essential element supporting the functioning of our society, not only providing essential services but also expressing the goals and aspirations of a culture: what do we choose to build and why? Truly existential questions revolve around infrastructure, from social justice to economic development to the choice of beauty versus utility for key elements like bridges and buildings. This second realization led us to develop a course for all disciplines,[6] not just civil engineers, in the hopes that learning across disciplines would enrich the experience for all involved, helping us to see the world around us more completely – a noble goal for anyone who wishes to call themselves educated.

This philosophy of design has led this course, infrastructure engineering, to have an impact well beyond West Point. At first alone, and then in partnership with Phillip Parker and Mike Penn in the Center for Infrastructure Transformation and Education (CIT-E) at the University of Wisconsin, the course has propagated nationally,[7] and an extensive catalog of course materials is now available.[8] Importantly, infrastructure courses at most or all other institutions are taught principally to civil engineers; it is our contention that a wide array of disciplines is necessary to address the deep, systematic infrastructure problems facing our Army, nation, and world.

So, what was learned during our undertaking of infrastructure projects in support of counterinsurgency (COIN) operations in Iraq and Afghanistan? Principally, that there was a strong need for better understanding of infrastructure across all undertakings, from target selection to tactical operations to mobility to simple health and welfare functions, and that this need was not just among the engineers. Infrastructure is not just a supporting

3 Meyer et al., "A Global Curriculum".

4 Hart, Steven D., J. Ledlie Klosky, and Scott Katalenich, "Conceptual Models for Infrastructure Leadership." *Journal of Management in Engineering* 30, no. 3 (May 2014): 04014003.

5 Hart, Stephen D., J. Ledlie Klosky, Scott Katalenich, Berndt Spittka, and Eric Wright, "Infrastructure and the Operational Art: A Handbook for Understanding, Visualizing, and Describing Infrastructure Systems." US Army, Report Number ERDC/CERL TR-14-14, 2014.

6 Hart, Stephen D., and J. Ledlie Klosky, "Infrastructure – A Liberal Art for the 21st Century." *The CIP Report*, George Mason University, School of Law, Center for Infrastructure Protection and Homeland Security, Arlington, VA, 12(5), 2013; Hart, S., J. Ledlie Klosky, Joseph Hanus, Karl Meyer, Jason Toth, and Morgan Reese, "An Introduction to Infrastructure for All Disciplines." In *Proc., ASEE National Conference*, ASEE, Washington, DC, 2011.

7 Esmaeili, Behzad, Philip J. Parker, Steven D. Hart, Brooke K. Mayer, Led Klosky, and Michael R. Penn, "Inclusion of an Introduction to Infrastructure Course in a Civil and Environmental Engineering Curriculum." *Journal of Professional Issues in Engineering Education and Practice* 143, no. 2 (April 2017): 04016020. https://doi.org/10.1061/(asce)ei.1943-5541.0000310.

8 "Model Introductory Infrastructure Course." CIT-E. Center for Infrastructure Transformation and Education. Accessed June 21, 2020. www.cit-e.org/.

element – it is a strategic tool for security, stability, and economic development. This is because infrastructure is a system of systems, a metasystem made up of the built environment, people, and information that meets the needs of people, communities, nations, and the world. These systems are often complex, always interdependent, and must be designed and operated in a way that is both reliable and robust. Infrastructure problems, at their root, are the definition of a wicked problem.[9] These systems are also the bones of our daily lives; it can thus be strongly argued that to produce graduates who are ready to positively engage and lead in the solution to society's pressing questions, as is the stated goal of higher education, a scholar must have knowledge of at least the rudiments of the fibers of that daily life.[10]

Course objectives

The course objectives are set out on the first day of the course, supporting the academy's course catalog, and are as follows:

1 Identify, assess, and explain critical infrastructure components and cross-sector linkages at the national, regional, and municipal levels.
2 Calculate the demand on infrastructure components and systems.
3 Assess the functionality, capacity, and maintainability of infrastructure components and systems.
4 Evaluate infrastructure in the context of military operations.
5 Prioritize and recommend actions to improve infrastructure resilience.

Course structure

To meet the objectives, the course is divided into five basic blocks. The lesson structure that is currently used to teach those five blocks has evolved and changed over time in the details, but the basic structure has been generally stable over time. This stability is despite a rather unconventional – at least for an engineering course – approach to the instruction, one in which the relevance of the early topics only becomes apparent as the course progresses and the connections manifest, rather like a mystery novel. Much of the scholarship underlying this structure is detailed in TR 14–14,[11] and the motivations for each of the blocks are described in the literature.[12] This structure is well supported by a fairly unconventional textbook, Brian Hayes' *Infrastructure: A Guide to the Industrial Landscape*[13] which, like the course, explains the engineering details of the infrastructure while at the same time setting it in the context of geography, history, and culture in which it resides.

9 Rittel, Horst W. J., and Melvin M. Webber. *Dilemmas in a General Theory of Planning*. Berkeley: Institute of Urban and Regional Development, University of California, 1973.
10 Hart and Klosky, "Infrastructure – A Liberal Art"; Hart et al., "An Introduction to Infrastructure."
11 Hart et al., *Infrastructure and the Operational Art*.
12 Meyer, "A Global Curriculum"; Hart et al., "An Introduction to Infrastructure"; Hart et al., "Conceptual Models for Infrastructure Leadership."
13 Hayes, Brian. *Infrastructure: A Guide to the Industrial Landscape*. New York: W.W. Norton & Company, 2014.

Setting a framework for understanding (Block 1)

The first block addresses a number of foundational topics meant to set the conditions for understanding, visualizing, and describing infrastructure systems with an eye toward enabling leadership within this complex space.[14] These systems are intensely complex, so setting a coherent framework is paramount. Thus, the block includes considerable exploration of infrastructure in government and society: definitions, critical infrastructure sectors and their relative importance to each other, orientation to the impacts of infrastructure on daily life, the place of infrastructure in Army doctrine, key players within the space (such as the Defense Critical Infrastructure Program (DCIP) within the Office of the Assistant Secretary of Defense for Homeland Defense and Americas' Security Affairs), USAID, DHS, and other organizations and their roles. Those introductory elements are followed by considerable focus on network science, as nearly every infrastructure system (transportation, water distribution, telecommunications, etc.) involves complex networks of interconnected components and systems. With these preparatory topics complete, the student is then presented with "The Big Three" models: the component, assessment, and infrastructure resilience models that were developed in support of this course and described in detail in TR 14–14.[15] This is followed by formal instruction in stakeholder analysis; infrastructure creation and operation nearly always involve a wide variety of stakeholders that must be considered carefully in order to balance function and efficiency against tough topics like economic viability, sustainability, social justice, environmental preservation, cultural sensitivity, and other factors that can truly make or break the success of a project. Block 1 then concludes with a practical exercise designed to get the students using the models and making tough decisions centering around difficult infrastructure issues. An example of this is examining the generation and disposal of solid waste, where cost, public health, bury versus burn, social justice issues associated with the location of transfer and disposal facilities, and other thorny issues force students to contemplate the fate of waste they generate every day.

The centrality of water (Block 2)

Water is the most essential element of human existence and is strongly tied to economic vitality, justice, the environment, and a host of other critical outcomes required to support creation and continuation of democratic, peaceful, and stable societies. In Resolution 64/292,[16] the United Nations acknowledges the human right to water, emphasizing that clean water is essential to the realization of all human rights. For any political or security solution to be workable, it must address water. Despite this, access to clean water is the last thing that most Americans consider in their daily life and the absolute first thing that those living without access to clean water think about when they wake up in the morning. Because of this centrality in all human activities, infrastructure engineering seeks to explore this essential resource and its role in the world.

The water block of instruction sets conditions for understanding the role of water in people's lives and includes detailed examination of potable water requirements, production and consumption, wastewater treatment, fire prevention, and the role of dams and

14 Hart et al., "Conceptual Models for Infrastructure Leadership."

15 Hart et al., "Infrastructure and the Operational Art."

16 "Resolution Adopted by the General Assembly 64/292. The Human Right to Water and Sanitation." A/RES/64/292 – E – A/RES/64/292. Accessed June 21, 2020. https://undocs.org/en/A/RES/64/292.

levees in water storage and flood control. As with Block 1, the content includes a variety of theory as well as practical exercises where specific numerical quantities are predicted or computed, and stakeholder analysis is reinforced through consideration of many users' needs. Tours of water treatment and wastewater treatment facilities cap off classroom instruction with practical experience.

The need for energy (Block 3)

Energy production and use, especially electrical energy, raises some of the great existential questions facing mankind. Who is entitled to use this precious resource? How is it divided between people and purposes? How should we produce energy, and who should pay for that production? What are the consequences of production, from exploration to extraction to use, and how are those consequences distributed – do some bear those consequences while others benefit? Global warming, environmental stewardship, economic vitality, and social justice; the topic of energy is full of important questions about who we are as a nation and as individuals.

The aim of the largest block in the course is to allow students to examine these important questions and to prepare them to lead in this space, establishing a baseline of knowledge related to energy with a focus on electrical energy. The block begins with the energy sector, including all energy sources and uses, and progresses to the specifics of the electrical energy sector. This block is also used to reinforce lessons from Block 1 related to stakeholder analysis, network theory, social justice, and especially the use of the three infrastructure models. This block has many engineering calculations, usually leading to discussions about what those abstract numbers mean for the very real people who are stakeholders in the system. The energy block also contains a number of practical exercises: studying the layout of a common home electrical system, a quick tour of the power systems of the classroom building, and a tour of a power plant.

Challenging students to think about the balance between the benefits of cheap energy – like high-speed travel and personal comfort from air-conditioning – and the very real negative impacts of energy use on public health and the environment leads to some excellent learning opportunities. For instance, reading about the impending closure of the large Indian Point nuclear power station in New York, the students are asked to discuss and recommend how and where the considerable lost generating capacity should be created and the impacts of that new production.

Movement of people and goods (Block 4)

Transportation systems are perhaps the most visible expressions of infrastructure in the world around us. Roads and rail lines cut across the landscape in endless lines while bridges soar across rivers and gorges in symphonies of concrete and steel, compelling us to consider their role in daily life. In Block 4, modes of transportation are explored, transportation systems are described, and detailed computations of traffic demands and level of service are undertaken. Following the pedagogical model of the previous blocks, basic descriptions of the elements of the infrastructure are followed by an examination of the relative positive and negative impacts of each of these elements. Students are then asked to examine transportation decisions and discuss the impacts of those decisions, including their overall scale. Like water and energy, the scale of the transportation infrastructure is so vast it is difficult to grasp, so specific local cases are examined.

Transportation networks are vast, and there are excellent maps of these systems. Roads, rail networks, air travel hubs and spokes, and subway systems are extensively mapped, and those maps can be found by students online. The practical exercises in Block 4 thus provide excellent real-world opportunities to revisit in depth the topics from Block 1, including especially network theory, social justice, and the resilience model.

Doctrine and practice (Block 5)

After examining the layers of water, energy, and transportation infrastructure that make up our world, students apply those concepts in Block 5 to a difficult infrastructure problem directly linked to their future profession as military leaders. In a world of increasing complexity and competition, infrastructure has an ever-growing role in the way societies function and the ways the military thinks and fights. Around the world, the next generation of Army stewards will operate in dense urban environments to disrupt or defend critical infrastructure systems in a setting of persistent disorder.[17] This course provides students the conceptual framework to integrate infrastructure into their operational planning and decision making, as military leaders now and as civilian leaders and citizens in the future. To reinforce this newfound set of tools, students are challenged to effectively put them into practice.

This block begins with a review of the current state of Army doctrine and its evolution, which has incrementally brought infrastructure to the forefront of modern military strategy. This walk-through of past military operations and milestones is an important exercise because it highlights the impacts, both positive and negative, of decision making on the built environment. Students observe communities immediately affected by disrupted electrical grids and inoperable water treatment plants, as well as the second- and third-order effects that follow. Given a better appreciation for sound decision making, students are now primed to use their own judgment in the course's culminating event, a scenario-driven operational problem that requires confidence, logical infrastructure planning, and risk management to navigate successfully. Specifically, students form teams to plan and execute an infrastructure-focused field reconnaissance, providing detailed tactical and strategic recommendations for receiving and supporting a battalion-sized element at West Point in response to a simulated crisis in New York City. Elements of this exercise were used as supporting information in a very real case, as the U.S. Army provided support to NYC during the COVID 19 pandemic.

Conclusion

The choices a society makes are expressed in concrete, steel, and changed landscapes as we create the built environment on which we rely for our daily existence. The ability to understand, visualize, and describe this infrastructure is an essential element in leading toward a better future, especially as we work toward stability in conflict zones, addressing global warming, achieving social justice, and striving for a sustainable way of living. A college course in infrastructure engineering is thus not a geeky engineering undertaking full of flow rates, British Thermal Units, and traffic analysis, though these things are important, but instead teaches a design way of thinking where the built environment dwells within the larger context of human endeavor.

17 "The US Army in Multi-Domain Operations 2028." Pamphlet 525-3-1, US Army, TRADOC. Accessed June 21, 2020. www.tradoc.army.mil/Portals/14/Documents/MDO/TP525-3-1_30Nov2018.pdf.

3 Armed Forces and Society

Thank you for (y)our service

Morten G. Ender

Military sociology awakenings[1]

Military sociology is deeply rooted in the United States. Yet it has a marginal standing in American Sociology. Military sociology was born in war during World War II. General Dwight Eisenhower commissioned *The American Soldier* series studies during WWII. Emerging out of the study findings are the origins of the sociology program at USMA. There were no sociological studies at West Point prior to World War II, but coinciding with the positive experience of sociologists working on *The American Soldier* series during the war, General Eisenhower wrote a letter dated January 2, 1945, to West Point's then-Superintendent, Major General Maxwell Taylor. Eisenhower offered an observation that "too many young officers were using ritualistic methods in the handling of individuals" and this necessitated "handling human problems on a human basis." While this letter did not directly result in a sociology program, it did pave the way for behavioral and social science courses designed to "*awaken* [italics added] the majority of Cadets" that ultimately led to the establishment of the Department of Behavioral Sciences and Leadership in 1977.

In this course, we will examine deeply rooted topics that have emerged out of sociology, including those at the individual, collective, social institutional, societal, and cultural levels. The purpose of the course is to develop an understanding of a range of social topics at the intersection of the armed forces and society from the micro to the macro level, including issues of (in)equality from a social, historical, and contemporary military standpoint – all as a capstone experience.

The purpose suggests that we will examine the people side of civil-military relations. This focus allows us to gain an understanding of the military in terms of who serves and under what conditions.

Welcome to Armed Forces and Society

Welcome to the study of Armed Forces and Society. The United States Military Academy at West Point first offered a sociology course in 1963. Two years later, in the fall of 1965, military sociology was offered for the first time. The first sociology majors graduated USMA in 1986.

1 This is an abridged version of a much longer and detailed course guide and syllabus. See the companion website for additional resources about this course.

Military sociology has been available at various times under different names at West Point. Not only has military sociology thrived at USMA, it has been a cornerstone course in the sociology program and in the Department of Behavioral Science and Leadership. PL482: Armed Forces and Society is a military sociology course. The course is one of a few such courses offered in the United States. Given the USMA mission, it has the added goal of inculcating you – our future Army leaders – with a sociological imagination.

This course guide/syllabus should assist you in the organization of your efforts toward successful completion of this course. Careful study of its contents will set the conditions for success in PL482.

In this course, we will examine topics that have long been of concern in the American and other militaries. With the help of sociology, we will analyze both the internal organization and practices of the armed forces and the relationships between the military and other social institutions. To understand the military and its place in society, it is necessary to consider the historical forces that have shaped the present. Thus, we will examine past events and policies as well as current ones. While our primary focus is on the American military and its relationship to American society, we will also fold in research on armed forces of other societies. Thus, you should complete this course with a sense of some of the alternative ways that American and other societies organize and relate to their military institutions. You should approach this course as a capstone experience – to bring together the breadth and depth of your undergraduate experience – both from previous courses, courses you are taking now such as Military Films, and this particular course – to bear on topics in both written and oral analysis.

Expectations

In this course, there are eight areas of expectation that I would like you to pursue. These are general academic course goals and will be defined with examples in the early lessons of the course. These general course goals include (1) cultural perspective, (2) historical perspective, (3) understanding human behavior, (4) communication, (5) lifelong learning, (6) creativity, (7) critical thinking, and (8) self-awareness.

Our behavioral objectives in this course are deceptively simple: namely to read, write, and speak well within a sociological context. You will have frequent opportunities to carry out these activities throughout the semester. The following notes regarding what we mean by these activities are based on *How to Read a Book*.[2]

> *Read well.* Reading sociology for understanding demands that you think and reflect upon the material until it becomes clear and meaningful. The reward is that you will leave the course with more robust and valid categories and frameworks for understanding why society works the way it does.
>
> *Write well.* It is a nagging mystery for many why they seem to have little trouble speaking but have a great deal of difficulty writing. To the extent that they really are good speakers and their words read well in print, the best recommendation is more practice with pen and keyboard. More often than not, however, the problem is a failure to actually read what one has written. Due to laziness or a time crunch,

2 Mortimer Adler and Charles Van Doren's *How to Read a Book* (New York: MJF Books, 1972).

we often submit our written work "unrehearsed." Just as our speeches and briefings are rarely polished until we have walked through them a number of times, so too are our first drafts until we have edited them. *If you cannot read your written words out loud comfortably, they are clearly in need of editing*. At the same time, your written work should not simply be a transcript of your speech. Slang or colloquial terms, tangential asides, and the like may occasionally be permissible in speech but are distracting on the printed page. You should read good writing in order to know what quality writing looks like. Seek remedial help elsewhere.

Speak well. Rules for good writing apply equally for good speaking. For example, the lack of complete sentences and paragraphs is even more noticeable on the printed page than in speech. In addition, your otherwise fine work will lose credibility if you use words incorrectly or imprecisely. No one is impressed by fancy words that are meaningless. Most importantly, your presentations must have a clear structure that takes the reader down the path of a logical argument to some conclusion. In this regard, good transitions are essential for moving your presentation (and the audience) along and to avoid becoming repetitive.

Course books

Ender, Morten G. *American Soldiers in Iraq: McSoldiers or Innovative Professionals*? (London and New York: Routledge, 2009).

Rohall, David E., Morten G. Ender, and Michael D. Matthews. *Inclusion in the American Military: A Force for Diversity* (Lanham, MD: Lexington, 2017).

Zimmerman, S. Rebecca, Todd C. Helmus, Corday Ogletree, and Marek N. Posard. *Life as a Private: Stories of Service from the Junior Ranks of Today's Army* (Santa Monica, CA: RAND Corp, 2019). Available on-line from the RAND Corp at: www.rand.org/pubs/research_reports/RR2749.html.

Evaluation and grading

The evaluation and grading of student work in this course is based on the assumption that learning is most effective as well as most enjoyable when students are evaluated against a known objective standard rather than against one another. In putting this philosophy into action, the largest part of the process has already been accomplished. This course guide contains the learning activities for which you are responsible (see Table 3.1). I provide the resources and experiences; *you* assume the responsibility for learning and applying the material. Grades will be based upon the following:

Class participation. Your participation in class will be evaluated for demonstration of achievement of course goals and contributing to the course in a positive way. Throughout the course you will be provided with a variety of opportunities to contribute to the class. Contributing to the course in a positive way involves actively engaging in the discussions not just by presenting or participating but through being prepared by asking and answering questions, engaging, supporting and critiquing your peers, and generally moving the course along in a focused and mindful way. We will establish a *student-centered learning environment*; your preparedness and willingness to contribute to robust, relevant discussions, debates, and conversations will help us apply and cultivate our sociological imaginations to better analyze armed forces and societies. Participation will be tracked in every class meeting and is worth 200 points/20% of the course grade.

Table 3.1 Summarized course schedule

Date	*LSN*	*Description*	*Special Note*
1/9	1	Course Introduction/Military Sociology	Ender
1/13	2	*Life as a Private: Stories of Service from . . .*	Ender
1/16	3	Classics/Demographics	Ender
1/21	4	Cohesion and Morale in the Military I	Discussants or Ender
1/24	5	Cohesion and Morale in the Military II	Discussants or Ender
1/28	6	War/MOOTW/Attitudes/Boredom I	Discussants or Ender
1/30	7	War/MOOTW/Attitudes/Boredom II	Discussants or Ender
2/4	8	Popular Culture and the Military I	Discussants or Ender
2/9	9	Popular Culture and the Military II	Discussants or Ender
2/10	10	Death & Dying in the Military I	Discussants or Ender
2/14	11	Death & Dying in the Military II	Discussants or Ender
2/19	12	**Capstone Team Meetings with Advisors**	In-Class – All
2/21	13	Sex/Gender in the Military I	Discussants or Ender
2/25	14	Sex/Gender in the Military II	Discussants or Ender
2/27	15	**Research Drop: Capstone Project Meeting**	Out of Class
3/3	16	**IPR/CITI Training/IRB/Presentations**	Discussants or Ender
3/5	17	Sexuality and the Military I	Discussants or Ender
3/17	18	Sexuality and the Military II	Discussants or Ender
3/19	19	Race & Ethnicity and the Military I	Discussants or Ender
3/24	20	Race & Ethnicity and the Military II	Discussants or Ender
3/26	21	Social Class and the Military I	Discussants or Ender
3/30	22	Social Class and the Military II	Discussants or Ender
4/3	23	Military Families I	Discussants or Ender
4/7	24	Military Families II	Discussants or Ender
4/10	25	**TRIP SECTION – DC & RAND Corp**	Voluntary
4/14	26	Deviance in the Military I	Discussants or Ender
4/16	27	Deviance in the Military II	Discussants or Ender
4/21	28	Mass and Social Media and the Military I	Discussants or Ender
4/24	29	Mass and Social Media and the Military II	Discussants or Ender
4/30	–	**Capstone Presentations – Projects Day**	All
5/5	30	Course Wrap-Up	Ender
5/8	30/40	**Capstone Due – 1630**	Ender
TEE	Week	**Non-Projects Day Capstone Presentations**	All Remaining

Group discussant. Collective members of three will be responsible for a topic of learning across two lessons. Ideally, you should select a topic that is practical for your group: timing and content. Your team's task is to facilitate a discussion that will yield academic and professional relevance. I will help contribute to and guide the conversation, but you are the main initiator and facilitator. Sign up for two discussant lessons. In your discussants, you will create a class that illuminates the main points of the readings (What? So what? and Now what?) – so you need to own this stuff! Feel free to discuss with me your prioritized preferred discussant topics as soon as your group wishes. I'll pass around a sign-up for a "first-come, first-served" basis. Your discussant will total 250 points or 25% of your course grade. There is a discussant criteria sheet at the end of the course guide (available on companion website).

IPR/CITI Training Certification/IRB. Your group will need to make an in-process review (IPR) presentation to the class of no more than 10 minutes of your group term paper. Your advisor should be present. Your team will need to complete the appropriate IRB forms – I will send out a sample early in the semester – I and/or your advisor can review. This will need to be submitted and approved before you can begin any human subjects research. Finally, each member of your team will need to have completed their CITI Training Certification (remember this from your Qualitative Methods Course? – www.citiprogram.org/). All of this is due on March 3/Lesson #16. This is worth 100 points/10% of your final grade (presentation criteria available on the website).

Capstone project. You will be responsible for defining a research question in military sociology, conducting library research, submitting an IRB for conducting research, and collecting and analyzing some form of data in both a final written report and a presentation. Criteria for the paper can be viewed later in the course guide. The group term paper will account for 350 points, or 35% of your course grade. Term papers are due the Friday before TEE week begins. Capstones are open projects from traditional analysis to evaluation based on Moskos's Postmodern Military model to an ethnographfilm – be bold (criteria sheet is available on the companion website).

Capstone Presentation Panel or Poster. The Capstone Paper Presentation will account for 100 points or 10% of the PL482 grade. Panels will be established (or poster presentations are an option) for Projects Day. Other group presentations will occur at the TEE with the remaining cadets and advisors. Historically, the sociology program presentations gain standing room only. If there's a conflict between thesis and Capstone Projects, we'll make accommodations. Panel presentations will follow IPR presentations (see companion website).

Course administration

Class preparation. We'll spend the majority of class time discussing the merits and limitations of sociological arguments and applying sociological concepts to the real world. We'll often engage in activities in and around military matters. We cannot do this unless we have a common language and are familiar with the basic concepts in the readings. Therefore, before coming to class, I expect each of you to actively read the assignments listed and be prepared to contribute to the course in a positive way. We will use the "What?" "So what?" and "Now what?" strategy for class discussion of each article around a particular theme or topic.

Recommended book. Harris, Angelique and Alia R. Tyner-Mullings (2017). *The Sociology Student's Guide to Writing*. Los Angeles, CA: Sage.

Class absence. If you are absent from class for any reason, try to let me know prior to your absence. Additionally, it is your responsibility to gain the information presented in class and in the readings.

Additional instruction. Additional instruction is readily available. If you need help, make an appointment to see me as early as possible. Do not wait until a minor problem reaches crisis proportions before seeking assistance.

Rules of engagement. We will show, both within and outside of our classroom, respect for law and order, personal honor, and the rights of others. Further, in our class: (1) everyone is allowed to feel they can work and learn in a safe and caring environment; (2) everyone learns about, understands, appreciates, and respects varied races, ethnicities, classes, genders, religions, ages, physical and mental abilities, and sexualities; (3) everyone matters; (4) all individuals are to be respected and treated with dignity and civility; and (5) everyone contributes in sharing in the responsibility in making our class – and the academy – a positive and better place to live, work, and learn. If you feel you cannot honor this code of conduct, we encourage you to withdraw from the course.

Recordings. Department policy forbids the taping or recording of any class or portion of a class without the written permission of the instructor, any speakers or guests, and each cadet attending the class.

I look forward to sharing this learning experience with you and welcome your ideas concerning how we can make our time together more rewarding.

4 Chemical engineering lab

Getting results

Matthew Armstrong, April Miller, Andrew Pfluger, Geoffrey Bull, Corey James, Enoch J. Nagelli, Trevor Corrigan, and Andrew Biaglow

Introduction

CH459 Chemical Engineering Laboratory and its follow-on, CH402 Chemical Engineering Process Design, are the two capstone courses for chemical engineers. In CH459, cadets build upon their chemical engineering knowledge through the design and execution of chemical engineering unit operations and the documentation of findings in acceptable scientific format. As a capstone experience, this course touches almost every aspect of the chemical engineering curriculum. The course occurs in the fall semester of the Firstie year (senior year). It is a 3.5 credit hour course with 40 lessons and 10 lab periods, resulting in 50 two-hour block meeting times each semester. This is unique at West Point in that every class meeting is a two-hour laboratory experience. The 50 lessons are broken up with one introduction lesson to outline expectations, two lessons to prepare lab equipment, 36 lessons for project execution, two lessons for WPRs and nine lessons allotted for cadets to obtain Safety and Chemical Engineering Education (SAChE) certification.

During the 36 lessons for project execution, cadets are responsible for completing six different projects in their assigned teams. These projects center around large, pilot-scale units, and each requires specific deliverables, which are listed in Table 4.1. The actual deliverables for each lab include an independently developed lab experimental design/procedure and a final product which includes data from a minimum of three successful runs, chemical engineering process controls Laplace block diagram, data analysis and calculations (including mass and energy balances), Kline-McClintock error propagation and error analysis, and a CHEMCAD model of the process with plausible explanations of discrepancies with experimental results. Student performance on each of these projects and all deliverables are directly tied to the "student outcomes" of the chemical engineering program.

Student outcomes describe what students are expected to know and be able to do by the time of graduation. Since the USMA chemical engineering program is accredited by Accreditation Board for Engineering and Technology (ABET), student outcomes are for the most part mandated by that organization, with one additional outcome added by the USMA chemical engineer program (Student Outcome 8).[1] The chemical engineering student outcomes are listed here. as presented in the USMA Redbook.[2]

1 Accreditation Board for Engineering and Technology, Engineering Accreditation Commission, Criteria for Accrediting Engineering Programs 2019–2020 (Baltimore: ABET, Inc., 2019–2020), 5, www.abet.org/accreditation/accreditation-criteria/

2 Office of the Dean, Academic Program (Redbook) (West Point: United States Military Academy, 2019), https://westpoint.edu/academics/dean/strategic-documents

Table 4.1 The six projects assigned to cadets in CH459, with their respective due outs

Projects	*Deliverables*
Saponification Reactions in Batch and Continuously Stirred Tank Reactor	• Optimization to fit reaction rate constants as a function of time • Piping and Instrumentation Diagram (P&ID) • CHEMCAD model • Error propagation (Kline-McClintock)
Operation and Analysis of a Cooling Tower	• Mass and energy balances • Number of transfer units (NTU) calculation • P&ID • CHEMCAD model • Error propagation (Kline-McClintock)
Operation and Analysis of a Hydrogen Fuel Cell Stack	• Mass balance • CHEMCAD model to calculate voltage • Fuel cell efficiency estimated • P&ID • Laplace block diagram • Error propagation (Kline-McClintock)
Distillation Column: Continuous Distillation of Methanol and 1-Propanol	• Mass and energy balance • McCabe-Theile diagram • Txy and xy diagrams • Number of transfer units (NTU) calculation • P&ID • CHEMCAD • Error propagation (Kline-McClintock)
Continuous Absorption of CO_2 from Air	• Mass balance • Number of transfer units (NTU) calculation • P&ID • CHEMCAD model • Laplace block diagrams • Error propagation (Kline-McClintock)
Operation, Analysis, and Modeling of a Double-Effect Evaporator	• Mass and energy balances • Overall heat transfer coefficient calculation • Number of transfer units (NTU) calculation • Laplace block diagrams • CHEMCAD model • Error propagation (Kline-McClintock)

The USMA Chemical Engineering Student Outcomes are: on completion of the chemical engineering program, our graduates demonstrate an ability to:

1 Identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics.
2 Apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors.
3 Communicate effectively with a range of audiences.
4 Recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts.

5 Function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives.
6 Develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions.
7 Acquire and apply new knowledge as needed, using appropriate learning strategies.
8 Understand the chemical engineering curriculum, including advanced chemistry, material and energy balances, safety and environmental factors, heat, mass, and momentum transfer, chemical reaction engineering, continuous and staged separation processes, process dynamics and control, modern experimental and computing techniques, and process design.

The first seven student outcomes are determined by ABET in consultation with its member professional organizations and appear verbatim in the Criteria for Accrediting Engineering Programs. These outcomes are common to all engineering disciplines, including chemical engineering. Student Outcome 8 was added by our program to emphasize alignment with the topics in the Chemical Engineering Fundamentals of Engineering Exam.[3] This was done to allow the use of the results from the exam to make program improvements.[4] Student Outcomes 3, 5, 6 and 8, indicated in bold, are assessed in CH459 using specific graded embedded indicators. The embedded indicators are encoded into a grading rubric that is used to assess performance in experimental design, data analysis, process control, process modeling, and error analysis. The remainder of this article discusses the projects executed, deliverables expected, rubrics used to assess cadet work, and the overall linkage to ABET outcomes.

Teaching methods

The course is managed to allow progressive learning, and improvement in deliverables is typically seen over the course of the semester. This improvement is driven by the in-progress reviews (IPRs), continued interaction between instructor and cadets, and the project "round-robin" methodology. The six projects assigned in the course are broken up into two round-robins, each consisting of a series of three projects. The teams rotate around the first three projects before moving to the second set of three projects. The first round-robin projects have lower complexity, which allows cadets to build on their learning gradually. These projects include the batch/continuously stirred tank reactor, hydrogen fuel cell stack, and cooling tower projects. The second round-robin projects, which are executed in the second half of the course, have greater complexity and more detailed deliverables. These projects include the distillation column, double effect evaporator, and gas-absorber projects. Six two-hour lab periods are allocated to each project, for a total of 18 lab periods for each round-robin. Each of the projects begins with procedure

3 The National Council of Examiners for Engineering and Surveying (NCEES), "Exam Specifications – FE Chemical," http://ncees.org/engineering/fe

4 Geoffrey R. Bull, Matthew J. Armstrong and Andrew Biaglow, "Using the Fundamentals of Engineering Exam to Assess Student Performance in a Chemical Engineering Curriculum," Conference Proceedings. American Society of Engineering Education Mid-Atlantic Regional Conference (October, 2016), www.hofstra.edu/academics/colleges/seas/seas-fall16-asee-conference-papers.html

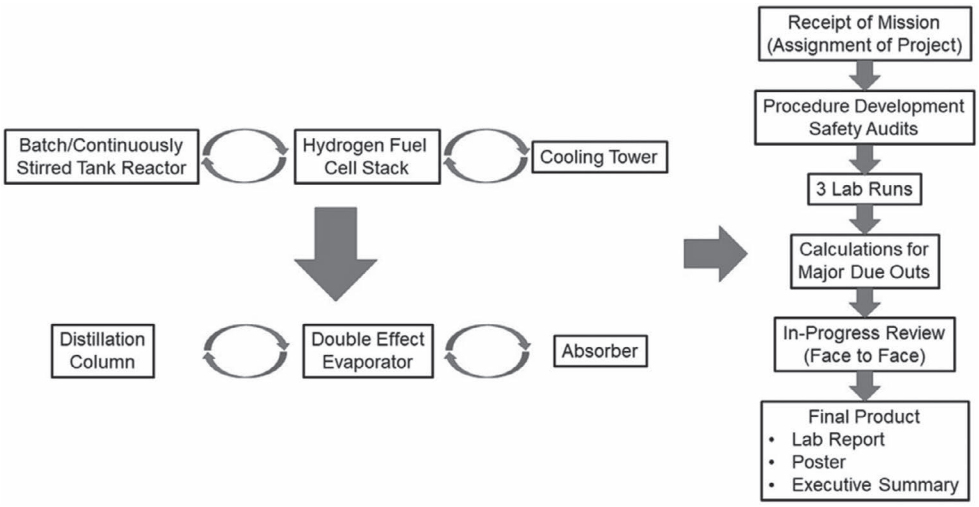

Figure 4.1 The six projects assigned in CH459 and the typical cycle for each of the projects. The projects are split up into two round robins, where the more complex projects are executed during the second half of the course. The due outs and final product vary with the project.

development and safety audits, which are deliverable items required prior to the execution of the procedures. Each project ends with the submission of an overall deliverable item, which includes all the specified deliverables for the projects listed in Table 4.1. The final product is in the form of a full lab report, a project poster, or an executive summary. Cadets are responsible for one of each type of deliverable in each round-robin, exposing cadets to various formats they will see in industry and the Army. A typical layout of a project's six-day cycle is shown in Figure 4.1. Each deliverable is graded using grading rubrics similar to Figure 4.2, the project-specific details in each rubric are adjusted slightly for each project. Cadets are provided with the rubrics ahead of time (at the beginning of the semester) so that they know exactly how they will be assessed. The completed rubrics are then used to assess the student outcomes.

At the start of the semester the classes are assigned to teams of 3–4 cadets, which are the teams they work with for the remainder of the semester. One of the cadets is assigned to be the team leader for each project. The team leader responsibilities rotate between projects. At the end of each lab period, the team leader must brief the instructor on the day's progress and chart the team's progress on the grading rubric. This ensures the cadets are receiving continuous feedback and that any misunderstandings or miscommunications of the expectations are identified and immediately clarified. Twenty-four hours following the sixth lab period block, each team must conduct an IPR with the instructor (six IPRs are executed per team per semester). This IPR further facilitates understanding and communication skills, and there is a corresponding grading rubric for the IPR, shown in Figure 4.3. The IPR and associated rubric provide validation of the students' ability to communicate orally and informally on the technical content of the project. This form of

CH459 AY19_1 Unit Operations Laboratory **Distillation** **Grading Rubric**

Level	Experimental Design	Data Analysis	Process Control	CHEMCAD	Error Analysis
5	Cadets have executed the procedures, recorded steady-state data, and replicated the experiment multiple times and under different conditions.	Cadets have produced a calculation summarizing the experimental findings and have used the equation to interpret their results.	Cadets list all variables, sensors, control elements and actions, *and produce a Laplace Transform Block Diagram for each control loop.*	Cadets compared CHEMCAD results with experimental results and explained discrepancies.	Cadets calculated the uncertainty in their results and determined the largest source of error in the experiment.
3	Cadets have developed procedures, executed them, and produced steady-state data for all process variables.	Cadets have produced an equation or calculation that summarizes the experimental findings.	Cadets list all process variables, sensors, and control elements, *and identify actions for each control element.*	Cadets developed a working CHEMCAD model but one or more important features of the experiment have been omitted.	Cadets identify process variables and determined errors associated with each.
1	Cadets developed working experimental procedures for cold startup and shutdown.	Cadets recorded temperature, pressure, and/or flow readings in an organized fashion.	Cadets *list* all process variables and their corresponding sensors, and identify which variables are under automatic control.	Cadets developed a working CHEMCAD model that contains the general features of the experimental apparatus.	Cadets identify process variables.

Rubric usage notes:

1. Rubric scores build up from level 1. Level 1 must be obtained first, then level 3, then level 5. You cannot jump levels.
2. All levels and quality of performance are determined by the instructor.
3. Cadets may ask for clarification at any time during the grading process.
4. Instructors may provide cadets with periodic updates of the rubric scores during the rotation.
5. Final rubric results may change after reports or posters are submitted.
6. Final rubric x3+25 points during IPR for total of 100 points.

Figure 4.2 Grading rubric used in CH459.

CH459 Unit Operations Laboratory **IPR** **Grading Rubric**

Level	Completion	Acumen	Presentation	Graphics	Appearance
5	Poster, executive summary, or lab report is complete; all guidelines for length followed	Work is perfect; contains zero conceptual or factual errors	Cadets present clearly and with confidence	Tables/ Figures/ Equations correctly formatted	Product is ready to submit
3	Poster, executive summary, lab report between 75% and 100% complete	1-5 mistakes explaining chemical engineering principles	Cadets have minor mannerisms that detract from presentation	>75% Tables, figures, and equations formatted correctly	Requires minor corrections with formatting; spelling, etc.
1	Poster, executive summary, lab report less than 75 % complete	There are mistakes with respect to explaining underlying chemical engineering principles	Cadet presentation is poor	Tables/ Figures/ Equations incorrectly formatted	Product requires major revisions

Figure 4.3 Rubric used for the In-Progress Reviews (IPRs).

Your Name:				Person Assessed:					
Program: Chemical Engineering				Major of Person Assessed: Chemical Engineering					
	1 – Needs Improvement	1	2	3 – Meets Expectations	3	4	5 – Exceeds Expectations	5	N/A
Technical Competence	Some misunderstandings of the technical content.			Demonstrated knowledge of the technical content.			Exceptional knowledge of technical content.		
Communication	Lacked sensitivity and/or could not provide suggestions for improvement.			Effectively communicated important points.			Exceptional ability to explain important points. Very effectively communicated ideas for improvement.		
Organization	Was not prepared or did not give sufficient time to prepare.			Demonstrated effective organization during class.			Was exceptionally efficient, timely and responsive throughout the entire process.		
Teamwork	Demonstrated limited ability to see other perspectives or find common ground.			Worked collaboratively with team members to reach consensus.			Exceptional ability to help group find common ground or resolve conflict in order to ultimately reach consensus.		
	Comments:								

Figure 4.4 Sample peer evaluation rubric.

communication is one of the ways that Student Outcome 3 is assessed (requirement that cadets communicate effectively with a range of audiences).

Cadets can expect an average of two iterations as lab team leader. As the lab team leader, cadets must fill out peer evaluations on each team member. The peer evaluation rubric is shown in Figure 4.4. Student Outcome 5 requires that cadets "function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives."[5] The rubric identifies technical competence, communication, organization, and teamwork skills as features that satisfy this outcome. For example, in Teamwork, the level of performance that meets expectations is working collaboratively with teammates to reach a consensus. Consensus building is a component of creating a collaborative and inclusive environment.

The final product, which is the consolidation of all deliverables for each project, is used to assess Student Outcome 6. Student Outcome 6 requires that the students be able "to develop and conduct appropriate experimentation, analyze and interpret data,

5 Accreditation Board for Engineering and Technology, Engineering Accreditation Commission, Criteria for Accrediting Engineering Programs 2019–2020 (Baltimore: ABET, Inc., 2019–2020), 5, www.abet.org/accreditation/accreditation-criteria/

and use engineering judgment to draw conclusions."[6] The first, second, and fifth rubric elements in Figure 4.2 (experimental design, data analysis, and error analysis) directly address this outcome. "Interpretation" is also assessed in the student's ability to produce a CHEMCAD model of the process. The use of CHEMCAD also allows us to assess the students' ability to make informed judgments, as well as their ability to utilize modern experimental and computing techniques and process design (Student Outcome 8). The process control element of Student Outcome 8 is also assessed in the third rubric element (also titled "process control").

Safety is an important component of chemical engineering education. The word "safety" appears in both Student Outcomes 2 and 8 (in italics). In chemical engineering, this is universally interpreted to mean process safety. To facilitate this component of the student's education, the American Institute of Chemical Engineers (AIChE) has created the Safety and Chemical Engineering Education (SAChE) online program.[7] As part of CH459, the cadets must execute all 10 modules of the SAChE program. Cadets also conduct an extensive pre-startup safety audit of each lab apparatus, in addition to a detailed proposed startup and shutdown procedure that will be modified during that lab's evolution. This is in conjunction with the development of a piping and instrumentation diagram (P&ID) to depict the piping, instrumentation, and chemical engineering automatic process controls embedded in that lab.

The way in which the course is managed and assessed has allowed our chemical engineering seniors to develop acumen in safety, risk management, chemical engineering automatic process controls, and scientific writing. Improvement is typically seen in the quality of the deliverables, including the posters, executive summaries, full lab reports, and, most importantly, the safe startup and shutdown procedures, which embody all the desired outcomes in a single event. As an example of cadet work, the list of steps shown in Figure 4.5 was developed by a cadet team for operation of the absorber. This procedure benefitted from several iterations with instructor feedback prior to execution. The procedure must be approved by the instructor before permission to execute is given. It is important to point out that while user manuals are provided, procedures are stripped out of those manuals beforehand, so the work produced by the cadets is original. The sample procedure shown here illustrates the level of detail expected from the students. For example, "HV" in Step 1 refers to "hand valve," so HV-5 is "hand valve number 5." The safety audit mentioned previously requires the students to inspect the apparatus carefully and to ensure that all hand valves are properly tagged. Of additional significance, the students are given access to the static equipment (no fluids flowing or active power circuits), so that they can conduct the audit and develop procedures. Step 7 illustrates attention to control parameters (P and I), indicating that the students are required to know the detailed functionality of the process controllers used in the apparatus (Student Outcome 8, process dynamics and control).

6 Accreditation Board for Engineering and Technology, Engineering Accreditation Commission, Criteria for Accrediting Engineering Programs 2019–2020 (Baltimore: ABET, Inc., 2019–2020), 5, www.abet.org/accreditation/accreditation-criteria/

7 Center for Chemical Process Safety, An AIChE Technological Community, Safety and Chemical Engineering Education (SAChE), www.aiche.org/ccps/community/technological-communities/safety-and-chemical-engineering-education-sache

1. Ensure that HV-5 is in the closed position and that the tank is full
2. Turn on power, silence and acknowledge the alarm.
3. Go to water control, turn it to manual and enter a value of zero
4. Turn on house air flow from the utility feed drop next to the absorber
5. Turn on the water pump on the control display, set the water flow to .4 and change it to automatic
6. Turn the column level control to automatic, ensure the set point is at 22
7. Change the tuning parameter of the column level control to the optimized conditions determined from experimentation (P = 737, I = 12 D = 0)
8. Wait for the column level to become stable at the set point of 22.
    a. If the actuator begins to oscillate with increasing amplitude, drop the integral tuning parameter to zero. Following that decrease the gain of the system, and allow it to come to a steady state at a point above the set point.
    b. Adjust the integral parameter to bring the system to steady state at the set point
9. Once the column level becomes stable, wait for a period of five minutes to ensure steady state conditions
10. Turn on the air compressor and wait for the flow rate to reach steady state
    a. If this is a second or third run then the group can open HV-5 at this point to obtain better initial measurements of CO_2.
        i. Ensure that there is air flow after the opening of HV-5 by adjusting the knob on the measuring device above HV-5
    b. If this is a first run or the group isn't confident in their procedure, valve HV-5 should remain closed until step 13
11. Take initial measurements before the addition of CO2 into the system.
    a. Several instruments that measure data are faulty for this system, so the first round of data collection should be performed with supervision
12. Turn CO_2 flow on into the system by opening the valve on the gas cylinder to the fully open position
13. Set the CO_2 SP to the desired value (minimum of .1) and switch to automatic control. Each trial should have a different set point, and it should increase by .05 each trial.
14. If HV-5 wasn't already opened, get an instructor to observe the opening of the HV pipe and turn the flow controller to the open position
15. Wait 10-15 minutes and then record a new batch of data on the RICL

Figure 4.5 Sample of cadet work – start-up procedure for absorber.

Summary and conclusions

CH459, one of the capstone courses for the chemical engineering program, is managed in a way to promote progressive learning by utilizing a round robin methodology. The deliverables produced are graded using rubrics that easily translate to ABET student outcomes and therefore readily support assessment. With this approach, consistent improvements in the quality of cadet deliverables has been observed. While not discussed here, validation of these improvements has been quantified by comparison of USMA's chemical engineering program with peer programs using the Fundamentals of Engineering Exam.[8]

8 Center for Chemical Process Safety, An AIChE Technological Community, Safety and Chemical Engineering Education (SAChE). www.aiche.org/ccps/community/technological-communities/safety-and-chemical-engineering-education-sache

5 Entrepreneurial leadership

Shark tank for warriors

Lissa V. Young

MEMORANDUM FOR: Cadets Enrolled in MG462
SUBJECT: Course Guide for MG462 (Entrepreneurship)

Welcome to your introduction to the field of entrepreneurship. A fundamental component of quality leadership and management is the ability to identify capability gaps, address market change or demand, and innovate organizational structure, policy, and procedure. Entrepreneurship is a mindset and a skill set that applies these abilities and processes. This course focuses specifically on developing in each student the abilities and process management skills of effective entrepreneurs. That is, each student will learn to adopt an innovator's mind and skill set. The course is designed to teach leaders a disciplined methodology for creating value through innovation in organizations. The course responds to three key drivers:

1 Assessments of the top 15 undergraduate business programs in the United States revealed that 100% of those programs taught courses in entrepreneurship, and students in those courses prepared for and participated in business plan competitions. As such, this course will add that value to the Department of Behavioral Sciences and Leadership's Management Program curriculum.
2 This course examines how leaders can create or transform organizations or products in the face of rapidly changing environments and markets. The course will provide cadets a foundation of knowledge, skills, and processes fundamental to successful entrepreneurship.
3 This course supports the specified WPLDS goals of *Academic Excellence & Character Development* and *Character Development* and fills a need not currently being met by the academy. As stated earlier, the definition of entrepreneurship epitomizes what we ask of our junior officers as they develop creative solutions to complex and ill-defined problems in volatile, uncertain, complex, and ambiguous (VUCA) environments. The course supports *Academic Excellence* by demanding that cadets work diligently inside and outside the classroom environment to obtain the essential knowledge and skills required to develop viable strategic operational plans (SOPs). This independent intellectual development improves cadets' critical thinking and cognitive abilities. Also, the course supports *Character Development* by exposing cadets to ethical dilemmas in and around the development and articulation of their innovations. Indeed, unprincipled entrepreneurs take harmful shortcuts and make unethical decisions to gain an unfair advantage. Conversely, this course reinforces principled entrepreneurialism in and outside the classroom. For instance, as cadets develop their ideas, they must consider the market demand for and impact of their product or service in a multicultural world, in which an innovation might benefit one population yet serious harm another one.

Additionally, this course has two organizing principles. The first organizing principle is to lay a foundation of knowledge and understanding of the elements of successful entrepreneurship. The second principle is to develop a commercially viable business plan and submit that plan for evaluation in the Mid-Hudson Regional Business Plan Competition. Through these activities, students will examine and experience firsthand the constitutional elements of entrepreneurship, leadership, and management.

Course goals and objectives

Course purpose:

1 To enable entrepreneurial minded students to develop their creative ideas for successful business ventures.
2 To inspire students to become thoughtful, reflective, and entrepreneurial leaders and to develop an informed, systematic, and dynamic approach to entrepreneurial leadership in organizations.
3 To enable students to develop their own business ideas and to present those ideas in a juried business plan competition.
4 The course capstone project will be the pitching of a business plan at the Mid-Hudson Regional Business Plan Competition, hosted by Marist University.
5 Winners in that competition will proceed to the New York State Business Plan Competition. All students in this course will accompany those who are qualified to go to the state championships.

Course organization

This course is divided into three interrelated blocks of instruction, all focused on participating in a juried business plan competition:

1 *Fundamentals of entrepreneurship*: This block provides an overview of commonly accepted entrepreneurial management concepts and a discussion of the fundamentals of business idea development.
2 *Business plan development*: This block introduces the key concepts of managerial planning and strategic thinking. In addition, this block will expose students to a variety of business plan structures, which will be utilized in the design and development of the capstone project.
3 *Business plan workshop*: Once students have developed their business plan ideas, they will take turns presenting their venture to the rest of the class. These workshops are designed to identify gaps and weaknesses in the student's business plan and provide constructive guidance for improvement.
4 *Mid-Hudson Regional Business Plan Competition*: Students will submit their business plans for evaluation by the judges of the Mid-Hudson Regional Business Plan competition. Regardless of who (if any) students are selected to compete the class will attend the competition at Marist University to watch the proceedings. You may explore the competition website here: www.marist.edu/mhrbpc/.
5 *New York State Business Plan Competition*: Teams who win first or second place in their category at the Mid-Hudson Regional Business Plan Competition will proceed to the State Championships.

Annex A

Course administration

Required texts

1 Aulet, Bill. 2013. *Disciplined Entrepreneurship: 24 Steps to a Successful Startup*. Hoboken: John Wiley & Sons.
2 Aulet, Bill. 2013. *Disciplined Entrepreneurship: Workbook*. Hoboken: John Wiley & Sons.
3 Barrett, Frank J. 2012. *Yes to the Mess: Surprising Leadership Lessons from Jazz*. Boston: Harvard Business Review Press.

Additional readings

All assigned readings will be distributed directly via email or Microsoft Teams.

Work submission

Late work will carry a penalty of *10% for each day* it is late. Talk to me *beforehand* if you anticipate submitting a late assignment. Note: all major assignments are required to be turned in to pass this course.

Class absence

If you are unable to attend class, please notify me in advance, if possible.

Additional instruction

Additional instruction is readily available. If you need help, make an appointment to see me as soon as possible. Do not wait until a minor problem reaches crisis proportions before seeking assistance.

Policy for written submissions

USMA Pamphlet, "*Documentation of Written Work*," applies to all written submission outside of class. *Little, Brown Handbook*, current edition, is the approved source for all citations. Use them! Lack of documentation can become a major issue but is easily avoided. Simply give credit to others when it is due, and then do it according to established guidelines. In PL470, *use APA format as your primary reference for citations*. One modification

to APA format is that you should single space each reference list entry but double space between entries. *DO NOT* use footnotes.

Formatting

Your business plan submissions should be in the font of your choice, single spaced, with one-inch margins all around. Use a cover page that is standard for all USMA graded requirements.

Grading

Your performance will be evaluated based on your ability to achieve predetermined standards, specifically, the course goals and supporting performance objectives. You are judged on your ability to meet these standards. As a criterion-referenced course, your performance determines your final grade.

Graded requirements

The following course requirements are laid out in detail in the rest of the course guide.

CADET PERFORMANCE ASSESSMENT. The course is 1,000 points, with means of assessment divided into two categories:

1 Team-based (two-to-four cadets) assessments (500 points):

   a Two SOP drafts (@150 points each) = 300 points
   b A final formal SOPs to include all marketing research and financial pro forma data = 200 points

2 Individual assessments (500 points):

   a Six quiz to assess students' comprehension of and ability to apply the course content material (@50 points each) = 300 points
   b Additionally, each student will be assessed on class contribution, which is determined by how involved the student is in his or her team's and other teams' SOPs ideas and development = 200 points

Annex B

Class contribution/citizenship

1 Reflecting the philosophy of participation and shared-learning in the course, every student is expected to actively engage in everyone's learning. Come to class prepared to share – *to engage in conversations* – and to contribute to our mutual understanding of entrepreneurship. We all have a *shared responsibility* for learning. *Both* the quality and quantity of your input count – neither by itself is sufficient. Additionally, we travel a lot, and your active engagement and assistance with trip section logistics is expected (and very much appreciated).

2 The quality of your participation in class is based on several factors. First, your comments in class should reflect familiarity with the concepts that are the topic of discussion for that class, and they should contribute to your classmates' learning and understanding of the material. Second is the degree to which you have reflected on these concepts and applied them to your and your classmates' business plan development. Third is the degree to which you actively engage in your classmates' pitches and the level of constructive and insightful feedback you provide.

Annex C

Course schedule (01/02)

LESSON	DATE	TOPIC	ASSIGNMENT	TIME	TIME
Lesson 01 (04)	Wednesday 17 Jan	C Hour (1.0) Introduction to the Course "What is a Business Plan?" Mid-Hudson Regional Business Plan Competition Judging Criteria and Application Procedures.	1. Read MHRBPC Judging Criteria, MHRBPC Application 2. Assigned Readings a. UROP Proposal – BioStasis b. UROP Proposal – SENSA c. UROP Proposal – Sentiel Project 3. Bring Your Schedule – We will determine a meeting time that works best for everyone. 4. Read the Course Guide	1.0	2.0
Lesson 02 (06)	Tuesday 23 Jan	C Hour (1.0) Entrepreneurship & Entrepreneurial Leadership (01\02) Note: Assign Trip CIC\ACICs Note: Start Workshop Sign-Ups	1. Why the Lean Start-Up Changes Everything 2. The Nuts and Bolts of Business Plans 3. The Nuts and Bolts of Business Models 4. The Nuts and Bolts of a Technology	1.0	2.0
Lesson 03 (07)	Thursday 25 Jan	C Hour (1.0) Entrepreneurship & Entrepreneurial Leadership (02\02) Note: Complete Workshop Sign-Ups	1. Business Plan Guide 2. Real Entrepreneurs Don't Write Business Plans 3. Virtual Ink Business Plan Example 4. MHRBPC Judging Criteria (from the website)	1.0	2.0
Lesson 04 (08) 01 Day	Monday 29 Jan	RESEARCH PERIOD DROP for Soldier Design Competition Attendance	1. Work on your business ideas 2. Work on Your MHRBPC Application 3. Prep Criteria Sheet for Observing the SDC	0.0	2.0
Lesson 05 (09) 02 Day	Tuesday 30 Jan	TRIP SECTION (4.0) Attend the Soldier Design Competition in 223 Mahan Hall. Event occurs during I & J Hours, and again during Dean's Hour.	Look for marketable ideas at the competition, and then approach those design teams to see if they would like to compete with you in the MHRBPC. 1. Read MHRBPC Judging Criteria 2. Work on Your MHRBPC Application 3. There will be no class on Wednesday 31 JAN 18	0.0	4.0
Lesson 06 (10)	Friday 02 Feb	C Hour (1.0) Discuss Ideas Gathered from the Information Session and the Soldier Design Competition	1. We will discuss ideas you saw at the DARPA Competition 2.Watch the MHRBPC Information Session Video (http://www.marist.edu/mhrbpc/infosession.html)	1.0	2.0
Lesson 07 (11)	Tuesday 06 Feb	C & D Hour (2.0) 1000-1100: Financing a Business – Presented by CPT Fennessy 1100-1200: Marketing Overview for Entrepreneurs – Presented by COL Woodruff	1. Sharpe, Assembling Resources-Investors (27 slides –will be sent out by Dr. Young) 2. Walter:How toGet Creative with Your Startup Fundraising Approach 3. Zwilling: The 10 Most Reliable Ways to Fund a Start-Up	2.0	2.0
Lesson 08 (12)	Thursday 08 Feb	C HOUR (1.0) MHRBPC Information Session Trip Section Preparation and Planning	1. Find samples of Business Plans that you think fit well with your business idea.	1.0	2.0
Lesson 09 (13)	Monday 12 Feb	TRIP SECTION (4.0) NO CLASS MHRBPC Information Session 1600-2200 Hours	1. Trip Section to Attend the Business Plan Competition Information Session at Marist University in Poughkeepsie, NY 2. CIC: & ACIC:	0.0	4.0
Lesson 10 (14)	Wednesday 14 Feb	C & D Hour (2.0 Hours) Business Plan Workshop #01(Share with the class your initial business ideas. Come prepared to participate in critical conversations about each other's business ideas. Share your sample business plan models.)	1. Sample Go to Market Plan 2. Sample Team Launch Process 3. Business Plan Presentation Advice 4. Class Meets in TH345	2.0	2.0
Lesson 11 (15)	Wednesday 21 Feb	C and D Hour (2.0) Business Plan Workshop #102(Cadet Presenters: Teams 03, 08 & 09) – Email first draft of business plan to the class roster (including Dr. Young) NLT 1800 hours Tuesday, 20 Feb, 2018.	1. Cadets will send their business plans to the class. 2. All others: Read Classmates' Business Plan 3. Sample Go to Market Plan 4. Sample Team Launch Process 5. Business Plan Presentation Advice	2.0	2.0
Lesson 12 (19)	Friday 02 Mar	C and D Hour (2.0) Business Plan Workshop #03(Cadet Presenters: Teams 02, 04 & 07) –Email first draft of business plan to the class roster (including Dr. Young) NLT 1800 hours on Thursday, 01 March, 2018	1. Cadets will send their business plans to the class. 2. All others: Read Classmates' Business Plan	2.0	2.0
Lesson 13 (20)	Tuesday 6 March	C and D Hour (2.0) Business Plan Workshop #104(Cadet Presenters: Teams 04, 08 & 09) –Email first draft of business plan to the class roster (including Dr. Young) NLT 1800 hours on Monday, 05 Mar, 2018	1. Cadets will send their business plans to the class. 2. All others: Read Classmates' Business Plan 3. Guest Speaker: Anthony DeToto (Class of 1991 & Joey DePinto (Class of 1986)	2.0	2.0
N/A	10-18 March	SPRING BREAK	HAVE FUN IN THE SUN		

Annex C: course schedule (02/02)

	Friday 23 March	Mid-Hudson Regional Business Plan Competition Applications Due to Marist University	Submit Your Applications on the MHRBPC Website		2.0
Lesson 14 (25)	Tuesday 27 March	C and D Hour (2.0) Business Plan Workshop #05(Cadet Presenters: Teams 05, 07, 08 & 09) - Email the first draft of your business plan to the class roster (including Dr. Young) NLT 1800 hours on Monday, 26 March 2018.	1. Cadets will send their business plans to the class. 2. Class Meets in TH345	2.0	2.0
Lesson 15 (26)	Thursday 29 March	C and D Hour (2.0) Business Plan Workshop #06(Cadet Presenters: Teams 02 & 09) - Email the first draft of your business plan to the class roster (including Dr. Young) NLT 1800 hours on Wednesday, 28 March 2018.	1. Cadets will send his business plans to the class. 2. Read Classmates' Business Plans 3. Class Meets in TH345	2.0	2.0
Lesson 16 (27)	THIS IS A 02-DAY PLEASE PLAN AHEAD Friday 30 March	TRIP SECTION (6.0) Bain & Company in New York City Bain Consultants will provide feedback on your business plan ideas Business Plan Workshop #07(Cadet Presenters: All But Teams 07 & 03) - Email the first draft of your business plan to the class roster (including Dr. Young) NLT 1800 hours on Thursday, 29 March 2018.	1. Cadets will send their business plans to the class. 2. Read & Critique Classmates' Business Plans. 3. Trip Section to Bain & Company in Manhattan. 4. Trip departs West Point at 1100 hours and returns at 1800 hours.	0.0	6.0
Lesson 17 (28)	Thursday 5 April	C and D Hours (2.0) OPEN PRACTICE Practice for MHRBPC (Teams 02, 06 & 10 As of this Version)	1. Bring your best constructive criticisms 2. I highly encourage teams to rehearse during this lesson	2.0	2.0
Lesson 18 (29)	Monday 9 April	C and D Hours (2.0) Rehearsal for the Mid-Hudson Regional Business Plan Competition Movement Briefing for Trip Section to Marist	1. Trip CICs Andrew Lee and Andrew Arenz will conduct a formal mission briefing for our trip on Friday 2. Come to this class with all requisite decisions made. 3. Final coordination will be conducted during this two hour period.	2.0	2.0
Lesson 19 (30)	Wednesday 11 April	C and D Hours (2.0) Final Dress Rehearsals for MHRBPC Observed by an Angel Investor	1. REFRIDGE & THE EXTRA MILE 2. Come loaded for bear 3. Listen carefully to the convoy briefing 4. Final Conditions Check 5. Mike Leffer of Baltimore Angels Investing will Skype in and provide constructive feedback	2.0	2.0
Lesson 20 (31)	Friday 13 April	TRIP SECTION (10.0) MID-HUDSON REGIONAL BUSINESS PLAN COMPETITION AT MARIST COLLEGE 3399 NORTH ROAD, POUGHKEEPSIE, NY 12601 845.575.3000	1. This is a L-O-N-G day. Come with phone and computer battery chargers, and back-ups to those battery chargers. 2. Knock 'Em Dead! 3. Observe, Listen, Learn 4. CIC: Carlson & ACIC: Barbe	0.0	10.0
Lesson 21 (32)	Tuesday 17 April	C and D Hour (2.0) MHRBPC AAR & Begin Preparations for Statewide Competition, If	1. Write an AAR for MHRBPC and Come to class prepared to discuss	2.0	1.0
Lesson 22 (33)	Thursday 19 April	C and D Hour (1.0) REFLECTION, RESEARCH & PREPARE FOR THE NY STATE CHAMPIONSHIPS	1. Reflect on what you learned in the Workshops and at the MHRPBC 2. Prepare for the NY State Competition in Albany, NY 3. Work on Your Business Plan Second Draft, integrating all lessons learned to date.	1.0	1.0
Lesson 23 (34)	Monday 23 April	C and D Hour (2.0) RESEARCH & WRITING PERIOD NLT 1800 Hours Submit 2nd Draft of Business Plans	1. Submit Business Plan Draft 02	0.0	2.0
Lesson 24 (35)	Wednesday 25 April	C and D Hour (2.0) Final Rehearsal for New York State Business Plan Competition Championships Movement Briefing for Trip Section to Albany	1. Rehearsal for Teams advancing to the Finals (This will be judged by MAJ Perlik, Dr. Lin & CPT High) 2. Conduct final movement coordination 3. Trip Section CICs, Keegan Carlson and Victoria will conduct a formal mission briefing for our trip to Albany	2.0	3.0
Lesson 25 (36)	Friday 27 April	TRIP SECTION (10.0 HOURS) NEW YORK STATE BUSINESS PLAN CHAMPIONSHIPS 257 FULLER RD, ALBANY, NY 12203 SUNYCNSE.COM (518) 437-8686	1. This is a L-O-N-G day. Come with phone and computer battery chargers, and back-ups to those battery chargers. 2. Come with backpacks filled with caffeine and snacks 3. If desired, plan to depart on leavelpass, if you have permission from your TAC	0.0	10.0
Lesson 26 (37)	Tuesday 01 May	C AND D HOUR (2.0) AAR of the New York State Business Plan Competition Championships & Open Practice for Projects Day	1. THE EXTRA MILE 2. Come to class with constructive criticism	2.0	1.0
Lesson 27	Thursday 03 May	USMA PROJECTS DAY (6.0 HOURS)	1. Good Luck! 2. Work on the final draft of your business plan	6.0	2.0
Lesson 28 (38)	Friday 04 May	C and D Hour (2.0) Course Wrap and AAR Submit 3rd and Final Draft of Business Plans NLT 1800 hours	1. Review Lessons Learned in the course and competitions and Integrate them into Third Drafts 2. Submit Business Plan Draft 03	2.0	2.0

6 Officership

Developing professional knowledge, identity, and inspiration

Jeffrey Peterson, Matthew S. Arbogast, and Matthew K. Clark

Course description

Officership (MX400) is West Point's capstone course and spans the character, academic, and military programs of the West Point Leader Development System (WPLDS), providing cadets a rigorous integrative experience to catalyze their transformation from cadet to officer. "Officership" is the expert practice of commissioned military service as an honorable servant of the nation. Officers are responsible to steward the Army profession and demonstrate Army expertise in support and defense of the Constitution, while remaining subordinate to civilian leadership and accountable to the American public. This course empowers cadets to internalize their professional identity as commissioned officers in the Army profession. Second, this course enables cadets to "connect the dots" between the different parts of their WPLDS education and developmental experiences and reflect on how to apply to apply their learning in their future profession. This is critical, as military expertise spans four broad realms: leader and human development, moral-ethical, geo-cultural and political and military-technical.[1] In MX400, cadets integrate knowledge and skills from across their education and developmental experiences to generate interdisciplinary approaches to complex military problems. This includes not only knowledge of military doctrine but also integrating concepts from across the core curriculum to include philosophy, law, history, psychology, economics, American politics, and international relations. Lastly, cadets hone their professional skills of critical thinking, collaboration, and effective communication. Upon completion of MX400, cadets should be committed to their role as commissioned officers and feel prepared to live honorably, lead honorably, and demonstrate excellence in the volatile, uncertain, complex, and ambiguous environment they are about to enter.

Course design

This course enhances professional development through an emphasis on reflection – a key component of leader growth, both for identity and intellectual development. MX400 provides the time and structure for cadets to conduct *integrative reflection* – looking back on their experiences and prior learning and thinking forward to who they must become and the challenges they will face.

Focused internally, integrative reflection improves self-awareness and helps cadets better understand the profession they are about to join – to internalize their professional

1 Department of the Army. *Army Leadership and the Profession,* ADP 6–22 (Washington, DC: Department of the Army, 2019), 1–4.

identity. Focused externally, integrative reflection provides cadets the opportunity to integrate and synthesize their prior learning across the curriculum and think through how to apply this knowledge within the context of realistic military problems – both historical and future challenges.

Figure 6.2 provides an overview of the major instructional blocks and assignments. Appendixes A and B provide additional details on each block. Integrative reflection occurs

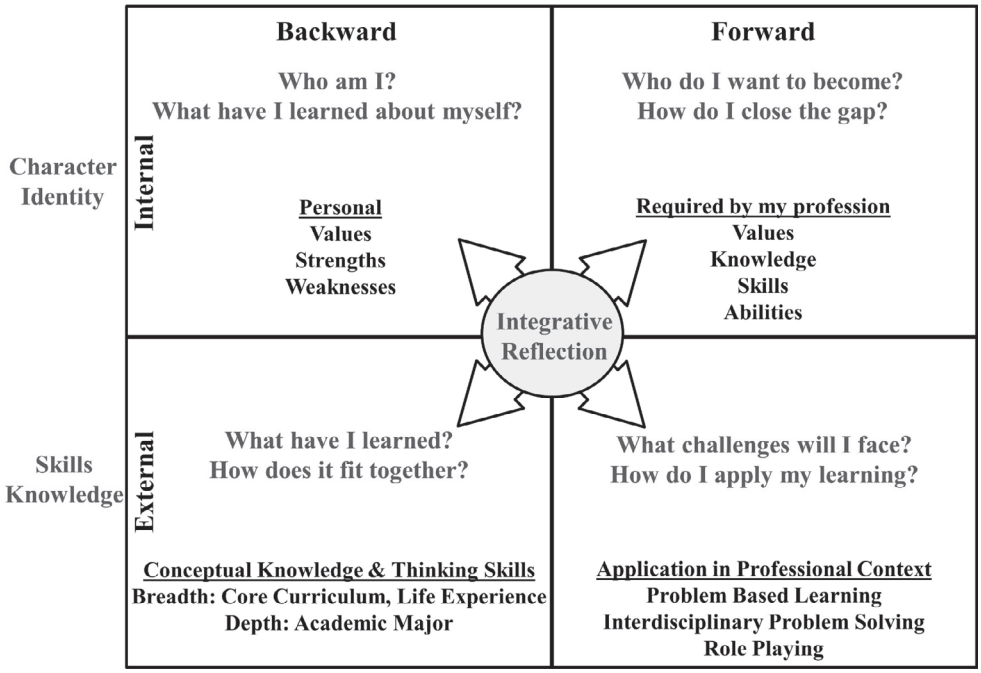

Figure 6.1 MX400 integrative reflection model.

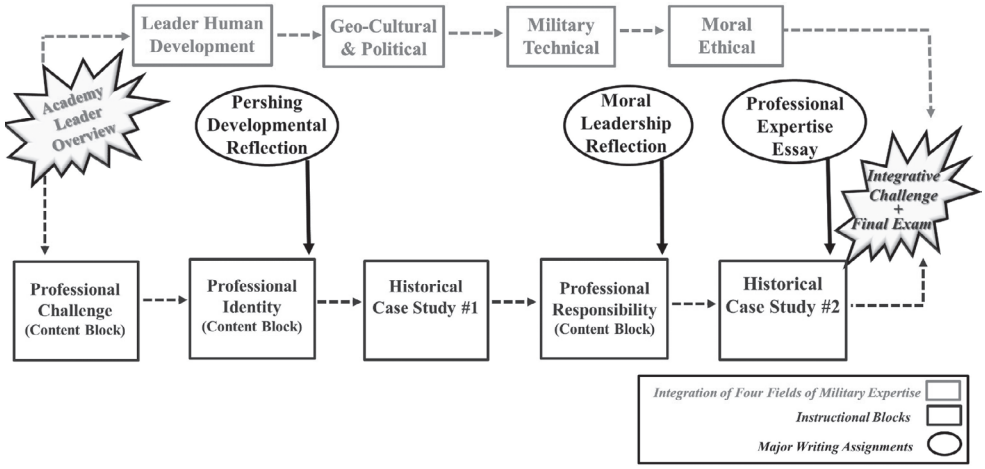

Figure 6.2 Officership course design.

Table 6.1 List of key course events, due dates, and point allocation

Key Course Event	*Lesson*	*Points*
Preparation Assignments (5 @ 40pts each)	Multiple	200
Pershing Essay (Self-Assessment)	10	100
Moral Leadership Reflection Essay	19	100
Professional Expertise Essay	27	100
Integrative Challenge	28–29	200
Seminar Leader Points	30	100
Term End Exam	30	200
	Total Points	**1,000**

both in and out of the classroom. In the classroom, MX400 is taught seminar style and revolves heavily around small group discussion. In discussion, cadets relate course content to their experiences, evaluate competing ideas, challenge each other's perspectives, and attempt to frame and solve complex challenges that span the four fields of expertise.

Cadets engage in *internal reflection* as they write the Pershing Essay, the Moral Leadership Essay, and two 500-word preparation assignments – analyzing and reflecting on the significance of the Oath of Office (Lesson 7) and reflecting on the concept of unlimited liability (Lesson 18). In addition to integrating previous learning, much of the content discussed in blocks 1, 2, and 4 supports this internal reflection by presenting ideas related to officership, the Army profession, Mission Command, and moral leadership.

Cadets engage in *external reflection* through exploration of two historic case studies spanning 11 of 30 lessons that allow cadets to identify and confront enduring challenges of officership. Additionally, two group presentation preparation assignments that require application of historic principals to a modern-day military problem, the Expertise Essay and the Integrative Challenge focus on future challenges (see Table 6.1). These future challenges are set within the context of *Operation Combined Resolve* (OCR) in Europe, a training scenario the Army uses to imagine what conflict may look like against various regional aggressors. In these assignments, cadets assume the role of a new platoon leader in a unit deploying to conduct combat operations in support of OCR. Platoon leaders – the entry level role of commissioned officers – are entrusted with leading 36 soldiers and are responsible for millions of dollars of equipment. In this realistic context, cadets apply their learning in problem solving and role-playing exercises.

Summary of graded events

Preparation assignments (5 at 40 points each, various lessons)

Homework assignments for specific lessons further the depth of classroom discussion through focused preparation or enhance self-reflection as cadets internalize their professional identity.

The General John J. Pershing reflective essay (100 Points, Due Lesson 10)

Self-awareness and lifelong commitment to growth are critical for leaders. In this 2,000-word essay, cadets to reflect on their preparedness for the demands of officership.

They consider the demands of officership and the Army profession, what they have learned about their strengths and weaknesses through their WPLDS experiences and 360 feedback, and then plan how to best use their remaining time to continue preparing themselves for commissioned service.

Moral Leadership Reflection Essay (100 Points, Due Lesson 19)

Providing strong moral leadership is a central responsibility of officers. In this 2,000-word essay, cadets apply a model for building moral strength (Lesson 15) to assess their own moral strength, identify and reflect on a moral failure, and create a plan to strengthen their moral self.

Professional Expertise Essay (100 Points, Due Lesson 27)

In a rapidly changing world, professionals must continually seek new knowledge to enhance their professional expertise. Sharing new knowledge with other members of the profession is critical. In this 2,000-word essay, each cadet is assigned an emerging topic related to one of the fields of military expertise and writes a white-paper to summarize implications for their unit's upcoming OCR mission. Cadets summarize the primary challenge or opportunity related to the topic, analyze and evaluate the impact on the unit's upcoming mission, and recommend a way ahead for the unit to prepare to face the challenge or exploit the opportunity. This requires analysis of relevant parts of the OCR scenario, research on the topic, and integration of relevant concepts from previous core courses. Additionally, cadets are required to address moral-ethical challenges related to each topic. Papers are shared and support the Integrative Challenge.

Geo-Cultural and Political

1) Culture training
2) Interoperability Challenges
3) Divergent Ethics
4) Presidential comments, US policy, and partner force trust
5) Political Decisions, Soldier Professionalism and Civ-Mil Trust
6) Stability Operations – "winning the peace" after the war

Military-Technical

Exploiting New Technology

7) Employment of quadcopters and other unmanned aerial systems
8) Robotic Complex Breach
9) Multi-Domain Ops – Capability Development & Integration

Mitigating Technological Threats

10) Countering the drone threat
11) Land Navigation and GPS Spoofing
12) Space Force and near peer threats
13) Russia and Emerging Technology Threats

Emerging Challenges

14) Subterranean operations
15) Urban Warfare Challenges
16) Competition Below the Threshold of Armed Conflict
17) The Changing nature of Civilians in Near-Peer Competition: Civilian's on the Battlefield vs. Insurgents

Leader-Human Development

18) Gender integration and multinational forces
19) Safety and training priorities
20) Officer development and emerging challenges and opportunities
21) Learning in the 21st century
22) Moral-Ethical Breakdown
23) Alcohol, Morale, and Trust Relationships
24) Organizational Learning on the Battlefield - Making our Team More Adaptive

Figure 6.3 Expertise essay topics.

Integrative Challenge (200 Points, Due Lesson 28–29)

The Integrative Challenge is designed to develop and assess cadet mastery of interdisciplinary knowledge across the four fields of expertise and their critical thinking, collaboration, and communication skills. Cadets must draw upon their entire undergraduate education and developmental experiences as they collaborate in small teams to address realistic OCR scenarios that are both ambiguous and complex. Given several days to prepare, cadets must prioritize the three most significant challenges, frame their understanding of the scenario with the Army's four fields of expertise and relevant concepts that fall within each, provide courses of action, and think through potential unintended consequences. After briefing a panel, the cadets must think on their feet and respond to unexpected changes in a role-playing exercise.

Seminar leader points (100 points, due lesson 30)

These points provide instructors flexibility to enhance learning. Areas of evaluation may include class participation, special projects, recitation of the oath of office, and reflection exercises.

Final exam (200 points)

The final exam consists of an essay section followed by short answer questions on select course concepts. Essay responses are to a realistic scenario similar to an Integrative Challenge scenario.

Assignments

Raymond A. Kimball

The Assignments section features six course assignments or assignment systems that come directly from the West Point curriculum. The content in this section is written to be broadly accessible to other scholars in the same and related disciplines. Jargon and West Point-specific language has been kept to a minimum; where it is absolutely essential, it is explained via footnote or explanatory text. All assignments are limited to ten pages to clearly communicate the essentials of the assignments and how they work. To achieve this end, the assignments make reference to essential works in the field rather than a literature review. The section contains assignments from philosophy, mathematical sciences, psychology, the Writing Across the Curriculum program, and leadership.

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7 The ethics of AI in war

Digital trigger

Scott Parsons, Christopher Korpela, and William J. Barry

Introduction

The increased development and use of artificial intelligence (AI) in the United States and the Department of Defense (DoD), along with the ethical concerns that AI and lethal autonomous weapons (LAWs) present, was the motivation for an interdisciplinary and interdepartmental collaboration between the Department of Electrical Engineering and Computer Science (EECS) and the Department of English and Philosophy (DEP). As officers of character, if we are going to be fighting our nation's wars using AI, we should be looking at and discussing the ethical implications of AI. The conversations centered around the ethics of AI are important to have with cadets. The cadets of today are the Army leaders of tomorrow. AI will be ubiquitous in their military careers and will be a crucial element to many aspects of the formations they will lead. This was the impetus of the Ethics of AI in War collaborative block for cadets taking the core philosophy and ethics block at the United States Military Academy at West Point. The project consisted of ethicists and instructors from DEP (Major Parsons and Dr. Barry) and robotics engineers and instructors from EECS (Colonel Korpela, Mr. Larkin, Mr. Manjunath, and Mr. Carey; see Figure 7.1).

In the last nine months, the executive branch, the DoD, and the Army have created a multiplicity of strategies, centers, and programs on AI. On February 12, 2019, the DoD unveiled its AI Strategy.[1] This was the day after the White House released an executive order that created the American Artificial Intelligence Strategy, which is directly tied into the National Defense Strategy.[2] Further, the Joint Artificial Intelligence Center (JAIC) was stood up at the Pentagon in June of last year to have oversight over almost all service and defense agency AI efforts. This coordination "is crucial to the emerging AI arms race with China and Russia."[3] Additionally, on February 1, 2019, the Army activated the AI Task Force at the birthplace of AI itself: Carnegie Mellon University.[4]

1 Department of Defense, "Summary of the 2018 Department of Defense Artificial Intelligence Strategy: Harnessing AI to Advance Our Security and Prosperity," https://dod.defense.gov/Portals/1/Documents/pubs/2018-National-Defense-Strategy-Summary.pdf.

2 Terri Moon Cronk, "DOD Unveils Its Artificial Intelligence Strategy," *Department of Defense*, February 12, 2019, https://dod.defense.gov/News/Article/Article/1755942/dod-unveils-its-artificial-intelligence-strategy/.

3 Sydney Freedberg, "Joint Artificial Intelligence Center Created Under DoD CIO," *Breaking Defense*, June 29, 2018, https://breakingdefense.com/2018/06/joint-artificial-intelligence-center-created-under-dod-cio/.

4 Carnegie Mellon University, "Carnegie Mellon Hosts Activation of U.S. Army AI Task Force," *Carnegie Mellon University*, February 1, 2019, www.cmu.edu/news/stories/archives/2019/february/army-ai-task-force.html.

Figure 7.1 Colonel Korpela, Mr. Larkin, Dr. Barry, Mr. Carey, Mr. Manjunath, and Major Parsons in the Robotic Research Center.

Soon, the DoD will deliver AI-enabled capabilities that address key missions.[5] While AI could be used by many of the Army branches, such as logistics and electronic warfare, the maneuver branches are likely to also see AI involved with their missions. With China and Russia trying to develop lethal autonomous weapons (LAWs), the DoD is motivated to continue research and development of a variety of AI, to include LAWs. The concern about the development of LAWs is not confined to the United States and her perceived adversaries like China or Russia.

The development of LAWs concerns a variety of other nations. Pakistan and India would each be concerned if the other was developing LAWs and employing them. Similarly, nations like North Korea and the Republic of Korea, Israel and Palestine, and Iran and the United States would be concerned if LAWs were being developed by their

5 Department of Defense, "Summary of the 2018 Department of Defense Artificial Intelligence Strategy: Harnessing AI to Advance Our Security and Prosperity," https://dod.defense.gov/Portals/1/Documents/pubs/2018-National-Defense-Strategy-Summary.pdf.

adversary. The idea of LAWs poses interesting ethical considerations. Should we allow machines to make the decision to kill? As technology and automation have increased accuracy, efficiency, and effectiveness in modern weaponry (precision-guided "smart weapons" like drones and laser/satellite guided missiles), would a LAW be more discriminate and proportional than a human? If an AI's action results in the death of a civilian or noncombatant, who is held responsible? Our position as instructors of cadets is that AI, LAWs (see Figure 7.2), machine learning, and robotics are reshaping every aspect of public and private life, and national security and defense are no exception. At the same time, we are coming to understand the many ways in which these technologies raise deep ethical, existential, psychological, and social issues (both positive and negative).

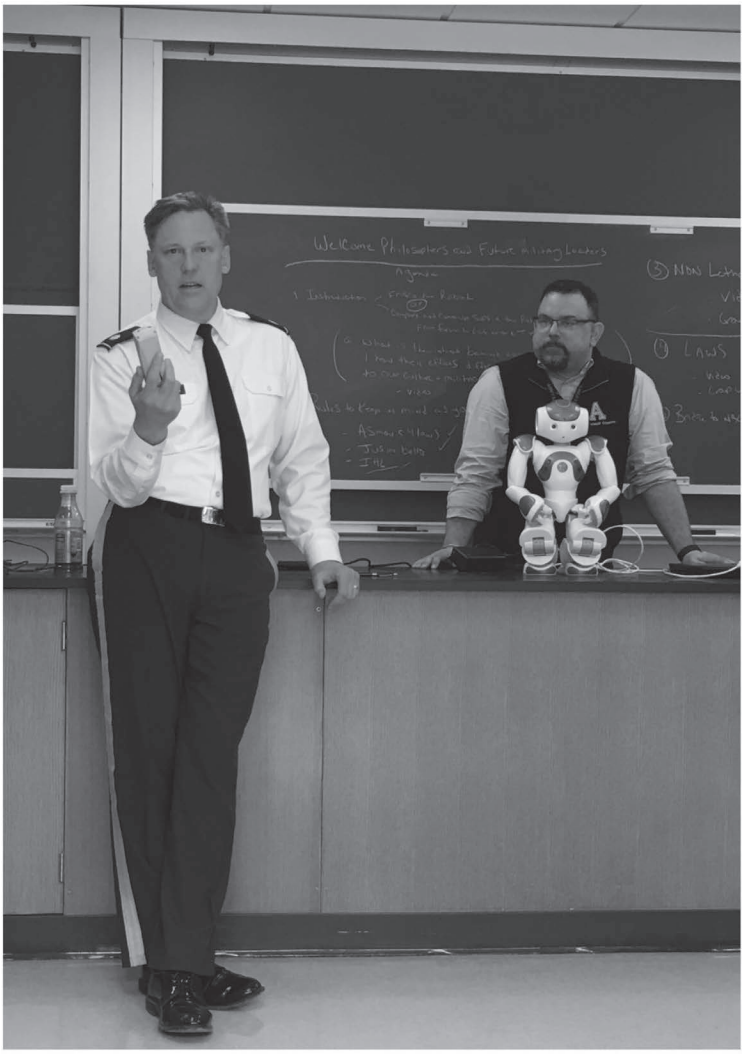


Figure 7.2 Major Parsons and Dr. Barry discuss the Ethics of LAWs with their students in a Philosophy and Ethical Reasoning class.

Innovative concept

We present cadets the argument that the lack of legal and ethical constraint by potential adversaries compels the United States to develop and employ autonomous weapons, both defensively and offensively, in an ethical way. Cadets face the challenge to consider the legality of the United States entering an autonomous weapon systems arms race, both lethal and nonlethal. The cadets explore whether there should be international legal restrictions on their use regarding humans in, on, and/or out of the loop. West Point's recently created Robotic Research Center aims to capture not just the engineering component of robotics, but also the crucial value and legal questions associated with these emerging technologies and their applications in war. In this way, the center contributes to West Point's overall mission to create leaders prepared for the challenges of future battlefields (see Figure 7.3).

Even though autonomous weapons systems must still adhere to our commitments to discrimination and proportionality, removing humans from the loop is legally and morally significant from the perspective of respecting the sanctity of human life. Human-out-of-the-loop weapons notably undermine our traditional notions of agency, responsibility, human dignity, and conceptions of just war. We challenge cadets' ethical reasoning and strategic thinking to consider being reluctant to make the choice for full autonomy and only to make it in the direst of circumstances, but ultimately, any rights-adhering nation that faces annihilation by a rights-violating, autocratic regime must be prepared to break free of the status quo in a supreme emergency. If human beings face death or severe injury by algorithms and microprocessors, we challenge cadets, the future leaders of the United States Army, to consider removing humans from the loop as both legal and ethical.

Most philosophy instructors spend one lesson on modern challenges to justice in war. This lesson usually covers newer technology such as unmanned aerial systems/remotely piloted aircraft (drones), cyber warfare, and other technological advances. We spent less than one hour on these technologies combined for the entire 30-lesson block of PY201. Recognizing the trend toward increasingly autonomous weapons systems, as well as cadet exposure to and interest in engineering problems, Major Parsons, Dr. Barry, and Colonel Korpela began the Ethics of AI in War pilot. This initiative occurred as part of a larger effort to expand the study of the ethics of AI at West Point. All three authors have experience working with AI, which sparked the idea for the collaboration. Major Parsons was the ethicist on a Defense Advanced Research Projects Agency (DARPA) Urban Reconnaissance through Supervised Autonomy (URSA) project and Senior Advisor at Ulsch Cyber, Inc., and is on the Advisory Board for Cyber 20/20, Inc., which is a company that

Figure 7.3 Colonel Korpela, Major Parsons, and Dr. Barry on an AI panel discussing the future of AI with guest Dr. David Hanson of Hanson Robotics.

develops artificial intelligence, deep-learning cyber threat hunting technologies, for the U.S. military and national security interests. Colonel Korpela is involved with the UN's Charter on the Use of LAWs, conducts research on AI as a Carnegie Fellow, and was an engineer on a DARPA URSA project. Finally, Dr. Barry was the Director of a Virtual and Mixed Reality Center for Learning at a university in Silicon Valley.

Using the lessons learned, including cadet feedback, from the first semester's pilot, Major Parsons, Colonel Korpela, and Dr. Barry expanded the program this semester, to include additional readings by AI experts, a group AI in war project, and a poster contest.

In addition, normative ethical theories and just war theory were introduced into the classroom earlier in the current pilot, allowing the cadets more time both in and out of class to consider the ethics of LAWs.

Teaching pedagogy

For two semesters in Academic Year (AY) 2019, in a pilot (two sections in fall AY19) and then an expanded pilot program (six sections in spring AY19), cadets in PY201: Philosophy and Ethical Reasoning classes participated in the seven-lesson block on the ethics of artificial intelligence. The AI block followed blocks on just war theory and normative ethical theories such as deontology, consequentialism, and virtue theory. With a good understanding of *jus in bello*, or ethical actions in war, the over 90 cadets looked at the use of AI and LAWs in war with considerations on discrimination and proportionality. Due to the success of both semesters, all three authors plan to continue with six sections in the fall 2020 semester.

The first lesson was a guest lecture by the preeminent roboticist and ethicist Dr. David Hanson of Hanson Robotics (see Figure 7.4). The next few lessons focused on

Figure 7.4 Mr. Larkin discusses the different kinds of AI being developed at West Point with the cadets in the Ethics of AI Program.

the ethics of LAWs and nonlethal weapons (NLWs). Following the ethics lessons in their philosophy classrooms, the cadets spent several lessons in the West Point Robotics Research Center.

For the next two lessons, the cadets were introduced to actual AI systems being developed at West Point and at the Defense Advanced Research Projects Agency (DARPA). The first 60 minutes of each lesson was a demonstration of how the AI worked, what it was used for, and why it was used (see Figure 7.5).

The remaining 15 minutes of the lessons discussed potential ethical concerns on the military use and applications of the AI the cadets were introduced to in that lesson. The final lesson of the AI block was allowing the cadets to have a hands-on experience with the various AI robots in the West Point Robotics Center. Some of the cadets took over the AI systems remotely, while other cadets sought ways to ensure their security or ways to defeat the AI systems (see Figure 7.6).

For the final lesson, following the hands-on experience, the cadets were asked to reflect on their experience using the AI and whether they expected to see similar forms of AI in their military formations in the next ten years. At the end of the Ethics of AI in War block, cadets were assessed in two ways. First, the cadets gave a group presentation on the ethical use of an assigned AI or LAW. Second, they created a single 24 × 36 poster based on their AI group project for a poster competition among the six sections of philosophy classes that took part in the Ethics of AI in War block.

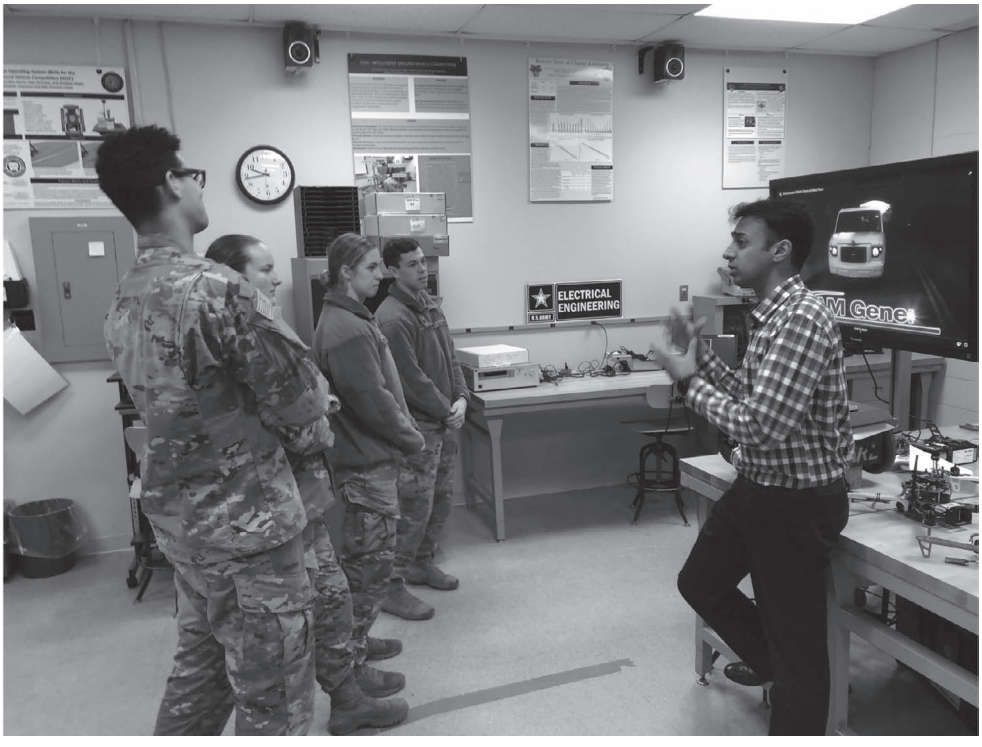


Figure 7.5 Mr. Manjunath discusses the driverless car being developed at West Point.

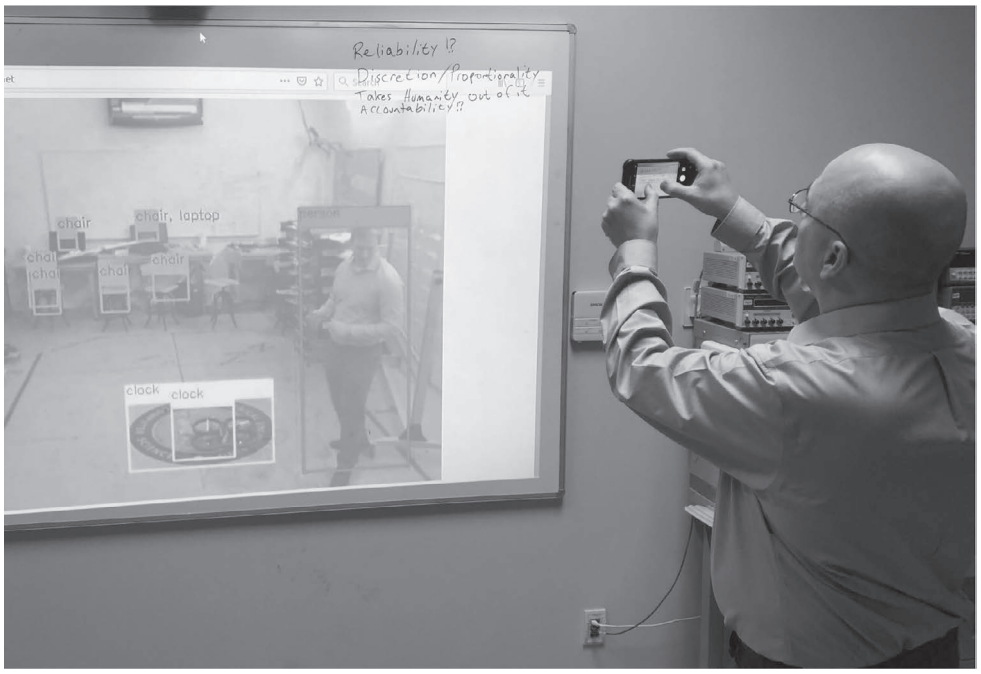


Figure 7.6 Mr. Larkin demonstrates how a drone-based non-LAW targets Mr. Carey.

Effectiveness – leader development

We are amid a revolution in military affairs. This is based on the creation and implementation of the DoD AI Strategy, the JAIC, and the AI Task Force. Our future leaders need to lead ethically in this new environment. LTG Jack Shanahan, the first director of the JAIC, points out that the JAIC has several critical mission themes. LTG Shanahan argues that the first is the effort to accelerate delivery and adoption of AI capabilities across DOD. "This underscores the importance of transitioning from research and development to operational-fielded capabilities. The JAIC will operate across the full AI application lifecycle, with emphasis on near-term execution and AI adoption."[6] Therefore, we must address AI and the ethics of AI at the USMA to help shape tomorrow's leaders. The ethics of AI project focuses cadets on the importance of the ethical use of LAWs and other AI in a creative hands-on way. It is not just getting to play with AI but to think about how to use AI ethically in war.

Final considerations & future needs

Primarily, Ethics of AI in War demonstrates the viability of six instructors from multiple disciplines sharing responsibility for cadet learning. Each lesson in the Ethics of AI in War block includes joint instruction, as well as information and research support from the Robotics Research Center.

6 Terri Moon Cronk, "DOD Unveils Its Artificial Intelligence Strategy," *Department of Defense*, February 12, 2019, https://dod.defense.gov/News/Article/Article/1755942/dod-unveils-its-artificial-intelligence-strategy/.

The ethics of AI project is cost effective. By taking existing instructors in the different disciplines, it allows for collaboration without the need of hiring more faculty. Further, it directly benefits faculty and cadets while meeting the Army's needs. Speaking from the Pentagon, DoD Chief Information Officer (CIO) Dana Deasy articulated, "As stated in the AI strategy, the United States together with its allied partners must adopt AI to maintain our strategic position, prevail on the future battlefields and safeguard free and open international borders."[7]

The Ethics of AI in War block embraces this mindset, situating cadets in an environment that helps to create the professionally and ethically competent officer CIO Deasey demands. With increased investment in the project, the Ethics of AI in War block could do even more. Major Parsons, Colonel Korpela, and Dr. Barry created this timely and unique Ethics of AI in War program to assist cadets in better understanding the intersection of ethics and artificial intelligence prior to their graduation and placement on a future battlefield. These future Army officers will be ready to fight our future wars ethically. Agile leaders will need to understand both the technologies and the ethics of their use. With modest investment, this project could grow in both quality and scope, reaching even more cadets and faculty, as well as constituencies outside of West Point. Finishing the second, expanded, pilot of Ethics of AI in War has shown itself to be a practical, interdisciplinary education block within the philosophy curriculum of these sections that can be shared across the other philosophy sections at West Point that did not participate previously. Alternatively, it could be expanded in complexity as part of a dedicated elective course that focuses on ethics and autonomous weapons systems, engineering ethics in general, or ethics and emerging technologies. With little to no increased resourcing, the Ethics of AI in War block could be expanded across all philosophy classes at the academy. Two other philosophy instructors have expressed interest in teaching the Ethics of AI in War block in the Fall AY20 semester. That will increase the number of sections teaching cyber ethics from six to 14.

Cadet comments about Ethics of AI in War have been overwhelmingly positive. The current pilot will gain a better understanding of the effectiveness of the Ethics of AI in War block in the course-wide feedback. This will help us gain indirect indicators of success across multiple learning objectives, though direct indicators gleaned through evaluation of cadet essays and through discussion and analysis of the ethics involved in their group presentations and posters on LAWs. Comparing the grades across sections in the previous three semesters, cadets in the Ethics of AI in War block improved their class average in both their just war theory essay and LAWs essay. The one shortcoming we encountered was the last day felt rushed. We will add another day to the block in the future in order to get everything in the block in a timely manner. The other option would be to cut some of the material so that we would not have to take a lesson from another topic.

7 Ibid.

8 An undergraduate project to develop statistical thinking and writing

Iterating to success

Kevin Cummiskey, James Pleuss, Bryan Adams, Dusty Turner, Randal Hickman, Charles Sulewski, and Krista Watts

Project overview

In this project, students use the investigative process to answer research questions of interest to them. They develop the research question, design their study, collect and analyze data, draw appropriate conclusions, and communicate their results to general audiences in writing. The project emphasizes an iterative approach, where students collaborate with their instructor throughout the investigative process, providing a research-like experience in an introductory course. We designed this project to align with the American Statistical Association's *Guidelines for Assessment and Instruction in Statistics Education (GAISE)*. Topics covered in this project include the investigative process, data analysis, statistical modeling and inference, multiple regression, and iterative writing.

The learning goals for this project are:

1 Develop statistical thinking and literacy by exposing students to statistical methods in the context of an investigation.
2 Use data to answer research questions of interest.
3 Fit and interpret statistical models.
4 Understand limitations of statistical analyses.
5 Communicate statistical results to general audiences.
6 Improve technical writing; foster an appreciation for writing as an iterative process and an integral component of scientific inquiry.

Students should be familiar with software (e.g., R or Excel) for descriptive statistics, data visualization, and statistical modeling. In addition, they should be familiar with basic statistical methods such as *t*-tests and regression. From our experience, instructors should allocate the following time for the project:

- One class period to introduce the project and assign groups.
- One class period for the instructor to provide students feedback on their research questions and study designs.
- One class period to conduct the peer writing workshop.
- Approximately 10–15 hours of student time outside of class to collect data, perform data analysis, and write/edit their technical report.

Why use this project in your course?

A primary goal of introductory statistics courses is to develop statistical thinking. Statistical thinking is a form of quantitative literacy that involves understanding variables can be related in complex ways and appreciating the role of randomness in the data we observe. Students develop this thinking when they collect data in pursuit of topics in which they have a vested interest in the outcome. However, the central challenge in allowing students to develop and investigate their own research question is their lack of experience in designing and implementing a study independently. Using an iterative approach, our project has instructors provide feedback to students at critical points. These critical points include the research question, study design, data collection plan, analysis plan, and the draft technical report.

Our project also emphasizes technical writing skills. It is a signature writing event in the West Point Writing Program (WPWP). The WPWP is a college-wide effort to integrate effective writing practices throughout the curriculum. We collaborated with the WPWP to develop many aspects of this project including a peer writing workshop. In the workshop, students read, discuss, and provide critical feedback on the draft projects of their classmates. This develops students' ability to critically read technical content and provide appropriate feedback. In addition, it allows students to get feedback without increasing instructor grading-time requirements.

Another benefit of allowing students to design their own studies is many students choose topics that provide valuable insights for their institution. For example, our students have looked at risk factors for vaping, impacts of sleep on academic performance, the effects of social media on self-esteem, and the benefits of eating breakfast. We invite leaders from across our institution to hear about their research on the last day of the semester. Students see how their research can help influence policy, and our leaders benefit from the information their projects provide.

Using the framework presented in this report, two projects from West Point have won recognition through the American Statistical Association's Undergraduate Statistics Project Competition for the quality of their statistical investigations (see www.causeweb.org/usproc/usclap/2018/fall/winners).

A course project where all students investigate the same research question using instructor-provided data has important limitations. First, the project topic will likely be of interest to only a subset of students. Effective statistical inquiry requires critical decision making throughout design and analysis – students gain experience with this decision making when they have a vested interest in the outcome of the analysis. Second, when instructors provide students the research question, study design, and data, students lose valuable experience with these important steps in the investigative process. When students are involved in all steps, they view statistics as a process of scientific inquiry requiring creativity and critical judgement, not just a set of procedures to follow to arrive at a single right answer. Developing their own research question and study design also supports the Thayer Method by instilling ownership in students for their learning.

Here are some helpful hints for instructors using this project for the first time.

- Students typically start with broad topic areas they need to refine to specific research questions. For example, they may be interested in sleep and academic performance, which they could refine to "Is there an association between the average hours per

evening a student sleeps and their final grade in the course?" It is important students have an appropriate research question to guide their study.
- Instructors can increase the complexity of student analyses by asking them to consider other (potentially confounding) variables. For example, in the sleep example, the students may want to consider how participation in an intercollegiate sport could explain an association between the sleep and academic performance.
- Exploring the data and validating model assumptions will give students important insights into the results of their statistical models and motivate more advanced methods.
- If students are going to collect data via survey, instructors should discuss research ethics and privacy concerns. We also recommend reviewing surveys before they are administered.

Information for students

Project description

Welcome to our course project! This project gives you the opportunity to investigate a research question of interest to you using methods presented in this course. You will work with your instructor to develop a topic, collect and analyze data, apply appropriate statistical methods, and report your findings. We hope you find this project interesting and informative. Start thinking about ideas now, because the best projects answer compelling questions or provide information on a problem in your dorm, club, athletic team, society-at-large, etc.

The course project consists of the following submissions:

a Project proposal. Submit a project proposal which includes your research question, a short literature review, and study design.
b Data analysis. Explore your data. Provide a one-page written summary of your observations along with appropriate descriptive statistics and plots.
c Draft technical written report and peer writing workshop. During this lesson, we will conduct a peer writing workshop to provide critical feedback on your classmates' statistical analyses and writing.
d Technical written report. Submit a summary (no more than three pages) of your analysis.

Tips for success:

- Choose a topic of interest to everyone in your group. Find something that you want to know more about. This may be something that helps your athletic team, club, or dorm.
- Effective communication is an integral part of scientific inquiry. Thus, writing is an important component of this project. Start early and refine your work iteratively.
- Figures/tables are effective displays of large amounts of information. If a figure appears in the main body of your report, you should reference it in the body of your text.

The following sections contain more information on each project submission.

Project proposal

The project proposal ensures you ask an effective research question. Submit the project proposal in a one-page executive summary format. The proposal consists of three areas: research question, literature review, and study design.

Research question

A starting point for research is often a research question. It is a clear, concise statement of inquiry that guides all stages of your analysis and reporting. Examples of research questions include: Why do some students perform better academically than others? Is socioeconomic status associated with life expectancy? How much would an additional room on your house increase its value? What are important factors explaining variability in crime rates across the United States?

Literature review

A literature review discusses previous published findings related to your research question. For this requirement, briefly summarize two scholarly articles related to your topic and discuss how your investigation is different from existing research.

Study design and data collection plan

In this section, discuss how you will conduct your study. Identify the observational units, the type of study (experiment or observational), the population of interest, the variables you will collect, and how you propose gathering data. Other notes:

- Consider multivariable relationships. For example, if you are interested in whether there is an association between gun ownership and suicide rates in US states, consider how education level changes the association.
- Use a quantitative response variable. Avoid categorical responses (you will have to take another statistics course to learn appropriate methods). For example, instead of "Does the state have a high suicide rate (Yes/No)," use the rate per 100,000 individuals.
- Ensure you have enough data. A good rule of thumb is 10 observations for each additional variable.

Peer writing workshop

The purpose of the peer writing workshop is to hone your ability to critically read statistical analyses while simultaneously receiving constructive feedback on your own writing. Writing is an iterative process of drafting, editing, and reviewing. As you read your classmates' drafts, make specific comments directly on their reports. Answer the following questions for each report.

1 Introduction

- What is the research question they are trying to answer? Is it clear in their report?
- Who benefits from this research? What makes this research interesting?

2 Data

- What is the population of interest in their study?
- Is the data appropriate to answer the question?
- How did they obtain their data?
- What criteria did they use to include/exclude observations from their analysis?

3 Methods

- What statistical methods did they use? Are they appropriate for their data and research question?
- How did they address confounding in their study?

4 Results

- Do they provide appropriate plots/tables to summarize their data?
- What does their statistical model say about their research question?
- Do they correctly interpret the result of the statistical model?
- Are the necessary validation plots included in the paper?

5 Discussion

- Do they discuss the generalizability of their results?
- Do they discuss whether observed associations are causal?
- Are there additional sources of bias they need to discuss?
- How do they address limitations in their research and possible future directions?
- Does the conclusion summarize their findings and answer the original research question?

6 General writing technique

- Where does the writer express ideas and findings with greatest insight?
- Where is the analysis sound and convincing, and where does it need to be enhanced?
- Where does the organization of the report support clear and logical flow?
- Where should transitions be strengthened?
- Did the writer use the proper format and write with effective tone? Where? Where not?
- Is the language clear, concise, and grammatically accurate?
- Do they correctly cite the work of others?

Technical report

The technical report should communicate the most important aspects of the project. It should be about 2–3 pages in length. Important figures and tables should be included and referenced in the main body of the report. Others can be included as appendixes and referenced in the main body. Use the following format as a guide for your technical report.

Abstract

Provide a one-paragraph summary of your project highlighting the research question, statistical methods, and important results.

Introduction

Discuss what you hope to accomplish with your research and what is already known about the topic.

- What is your research question? Why is it interesting, important, or relevant?
- Have others investigated similar questions? If so, what is already known about the topic? How is your research similar and different from existing research?

Data

Describe your data and how you collected it. You may want to include a table similar to Table 8.1.

Methods

Describe the statistical methods you used to analyze your data.

- How did you decide which variables to include in your final model?
- What assumptions do your models make, and how are you going to confirm their validity for your data?

Results

Briefly summarize important results of your data. Whenever possible, you should use figures and tables to display results. State your final model in equation form and use the equation editor for professional looking output. See the following example.

$$\hat{y} = 2.2 + 1.6x_1 - 82x_2 + 13.5x_3$$

Interpret the model and variable coefficients.

- What are the results of your statistical analysis?
- What do the coefficients and other output from the regression model tell us?
- What is the strength of the relationship between variables?

Table 8.1 Variables used in this study

Name	*Variable*	*Type*	*Description*
Violent Crime Rate	y	Quantitative	Number of violent crimes per 100,000 individuals
Death Penalty	x_1	Categorical	Whether a US state has the death penalty (1) or not (0)
BachelorPercent	x_2	Quantitative	Percent of population with bachelor's degree

Address the validity of your model's assumptions. You should investigate different diagnostic plots (for example, plots of the residuals) and discuss your observations here. Discuss how your results answer your research question. You should also address:

- Are the results statistically significant? Practically significant?
- Are the results consistent with existing knowledge about your question?
- What are some limitations of your current analysis?
- Given more time and money, how would you do to improve the analysis?
- To what population are you willing to generalize your results? Would you infer causality in any relationships discovered?

9 A proflective writing assignment in Advanced General Psychology for Leaders

Letter to the Future Self

Elizabeth L. Wetzler and David T. Feltner

Introduction

Instructors often encourage reflection to help students make sense of past experiences. However, the use of reflection for planning future behavior, or proflection, is less common. The Letter to the Future Self (LFS) is a proflective writing assignment used in Advanced General Psychology for Leaders at the United States Military Academy. The assignment can easily be adapted for use with civilian students and in other psychology or leadership education courses that include personal development goals, such as becoming more grateful or preparing for student leadership positions.

Reflection vs. proflection

Reflection is an essential and complex part of transformative learning.[1] It typically involves recalling past experiences and emotions and then connecting them in new ways with existing knowledge to form a different or more sophisticated understanding of the targeted information. Reflection is useful for making sense of past experiences, for understanding current situations, and for planning future action, although the processes and challenges associated with each type of reflection vary given the differences in temporal dimensions.[2] Adopting a retrospective versus an anticipatory focus when using reflection is common, given the tendency for people to consider reflection to be a backward-focused process as opposed to one focused inward or forward.[3] Reflecting for the purposes of future planning helps orient people toward the desired outcomes that they wish to approach; we call this proflection because the emphasis is primarily on looking forward. This focus may be especially useful because it encourages the person to envision and plan for possibilities regarding how future events might unfold.[4] Sharon Edwards argues that what she calls reflection-before-action and reflection-beyond-action, both of which would represent proflection, are important in nursing education to help students

1 Schnepp, Jerry, and Christian Rogers. "Evaluating the acceptability and usability of EASEL: A mobile application that supports guided reflection for experiential learning activities." *Journal of Information Technology Education: Innovations in Practice* 16 (2017): 195–214.

2 Van Manen, Max. "On the epistemology of reflective practice." *Teachers and teaching* 1, no. 1 (1995): 33–50.

3 Conway, Paul F. "Anticipatory reflection while learning to teach: From a temporally truncated to a temporally distributed model of reflection in teacher education." *Teaching and Teacher Education* 17, no. 1 (2001): 89–106.

4 Seligman, Martin E.P., Peter Railton, Roy F. Baumeister, and Chandra Sripada. "Navigating into the future or driven by the past." *Perspectives on Psychological Science* 8, no. 2 (2013): 119–141.

prepare for future interactions with patients.[5] Whereas reflecting on the past may be a well-practiced behavior for many students, they may need more prompting and guidance in how to engage in effective proflection. As such, a proflective assignment for cadets in a psychology class at West Point may help students learn to plan for future actions as they anticipate an upcoming transition to their first official leadership role at the academy.

Engaging in a proflective educational assignment using an epistolary or letter-writing form offers a novel and potentially valuable means of engaging in the process. Although the first author has used letter-writing assignments in this and other psychology courses in the past, this pedagogical approach does not appear to be as common as other formats, such as the use of journals, diary entries, or blogs. Still, writing letters to various audiences, whether it be the self or others, has proven useful in communicating about difficult topics in psychology and in women's studies classes.[6] More generally, writing letters can lead to benefits for the authors. For example, writing letters of gratitude is associated with increased happiness and better author well-being.[7] When the future self is the audience, a letter can be used to target self-understanding and self-development. Given that plebe (freshman) cadets have not yet assumed their first leadership role at West Point, forecasting their thoughts and actions in a letter to their future selves may prove especially helpful when they receive their letters back just days before becoming formal leaders for the first time. This timing allows for just-in-time intervention before they begin the new role.

Plebe and team leader roles in West Point

During plebe year, cadets are surrounded with different leadership examples from upperclass cadets to Army officers with 10 or more years of service. First they learn how to follow, then they gradually gain greater levels of responsibility and authority. The first official leadership role is that of a team leader; as a Yearling (sophomore), cadets are charged with the morale, health, and welfare of a single plebe. Team leaders advise, mentor, develop, and care for this plebe in their personal, professional, and academic development. Daily, team leaders inspect their plebe's uniform, barracks room, and ensure that their subordinate is adhering to all the standards expected of USMA cadets. These inspections require leaders to know the standards in detail and give the team leaders practice on making confident corrections. Upholding standards is an essential part of being an Army leader, and this is the first formal opportunity cadets have to practice these skills.

Beyond these basic inspections, team leaders conduct weekly training sessions, called Fourth Class Development Time (FCDT), where the team leader teaches a series of topics they determine to be relevant to the plebe's professional development. Team leaders

5 Edwards, Sharon. "Reflecting differently. New dimensions: Reflection-before-action and reflection-beyond-action." *International Practice Development Journal* 7, no. 1 (2017).

6 Chamberlain, Kerry, and Stephen Burrough. "Techniques for teaching critical reading." *Teaching of Psychology* 12, no. 4 (1985): 213–215; Charlesworth Jr, John R., and John R. Slate. "Teaching about puberty: Learning to talk about sensitive topics." *Teaching of Psychology* 13, no. 4 (1986): 215–217; Junn, Ellen N. "'Dear Mom and Dad': Using personal letters to enhance students' understanding of developmental issues." *Teaching of Psychology* 16, no. 3 (1989): 135–139; White, Aaronette M., Marcia Wright-Soika, and Monica S. Russell. "Epistolary connections: Letters as pedagogical tools in the introductory women's studies course." *Feminist Teacher* 17, no. 3 (2007): 204–224.

7 Toepfer, Steven M., Kelly Cichy, and Patti Peters. "Letters of gratitude: Further evidence for author benefits." *Journal of Happiness Studies* 13, no. 1 (2012): 187–201; Toepfer, Steven M., and Kathleen Walker. "Letters of gratitude: Improving well-being through expressive writing." *Journal of Writing Research* 1, no. 3 (2009).

know that they need to develop their plebes but must decide what their subordinates need to be successful. Creating a plan that highlights the strengths of an individual while tackling their weaknesses is difficult, and this is what over 1,000 Yearling cadets are learning through experience every year. Each team leader already possesses a mental model for this FCDT based off their own experience; however, they must think critically about how to create a thoughtful and individualized plan for their plebe.

The critical thought and emotional intelligence required to be a good team leader is the same required to be a successful Army officer. The team leaders must understand their subordinates' strengths and weaknesses and know how to inspire them to become leaders of character. They must be able to empathize and understand the struggles and anxieties of day-to-day plebe life. While each team leader was a plebe only a few months prior, they may have forgotten what it felt like to be the subordinate with no experience; they may no longer understand their plebe's point of view.

Assignment overview

As a precursor to writing the letter, plebe cadets first complete a psychometrically sound online assessment of their character strengths, called the Values in Action (VIA) inventory. The inventory is freely available at www.authentichappiness.sas.upenn.edu/. This highly reliable assessment rank orders 24 different character traits, such as honesty, authenticity, and bravery, in terms of strength.[8] According to the survey website, more than 8 million people worldwide have completed the VIA inventory, a testament to the survey's wide-scale popularity. Cadets then write the 6–7-page LFS, addressing two of their top strengths and providing illustrative examples from their own lives. After, they coach themselves on how to use those strengths when they become USMA team leaders. They also target two of their weakest strengths for improvement. Specifically, they coach themselves on how to develop these strengths using specific, measurable, achievable, realistic, time-based goals.[9] They weave relevant psychology theories and course concepts throughout the letter, allowing them to connect course material to their own lives. Cadets address the letters to themselves, seal them in envelopes and return them to the instructor, who holds onto them until Yearling year begins. Just as cadets are about to become team leaders, they receive the letters in the mail. The arrival of the letters at this critical point allows for a just-in-time intervention where they remind themselves of what is most important and how to use their strengths.

Cadets are given the following verbal guidance to communicate the purpose and intended outcomes of the assignment:

- Remember that this letter is for *you* – make the future version of yourself the best version that you can based off what you have seen thus far at West Point and what you have learned in this class. What can you do to develop yourself so you are ready to be the best team leader possible?

8 Christopher P., and Martin EP Seligman, *Character Strengths and Virtues: A Handbook and Classification* (Oxford: Oxford University Press, 2004).

9 Doran, George T. "There's a SMART way to write management's goals and objectives." *Management Review* 70, no. 11 (1981): 35–36.

- You understand what it is like to be a plebe, but by the time you are a team leader you will have grown as a leader/person and will no longer have the same point of view that you have now. This letter will show how and what you were thinking during your plebe year.
- You will get this letter just as you are about to embark on your first formal leadership position. That way you can remind yourself of what you considered to be important and recall what it felt like to have a plebe's point of view. What are the most important things to tell the *future you?*

Grading rubric

The LFS grading rubric details categories and point allocations currently used for the assignment. These allocations are easy to amend to match individual instructor preferences and can be tailored for use in different contexts or courses. Table 9.1 contains the grading rubric currently in use for the LFS in PL150 at USMA.

Table 9.1 Letter to the Future Self grading rubric

PL150 Letter to the Future Self Grading Rubric – 50 points			
Part 1 – The following requirements do not net points but could result in penalties if not included or completed as specified	**Deductions**		**Comments from Instructor**
Completion of VIA Survey – copy of survey results attached			
Copy of this rubric submitted with letter			
Submitted electronically by 4:00 p.m. on due date (10% penalty for each 24 hours late)			
APA compliance			
Follows letter format			
Part 2 – Elements of the LFS that address two of the top three character strengths	**14 points possible**		
Strength 1: Identification, explanation, and example of strength (1), identification, definition, and explanation of course concept (3), how to use the strength as a team leader and why you should retain it (3)	7 points		
Strength 2: Identification, explanation, and example of strength (1), identification, definition, and explanation of course concept (3), how to use the strength as a team leader and why you should retain it (3)	7 points		
Part 3 – Elements of the LFS that address two of the bottom three character strengths	**30 points possible**		
Weaker strength 1: Identification, explanation, and example of strength (1), discussion of why it is critical to develop (3), identification, definition, and explanation of course concept (3), how to use the strength as a team leader (3)	10 points		
Concrete plan for how to improve in this area – using SMART goals (must address each of the 5 aspects of SMART goals)	5 points		

(*Continued*)

Table 9.1 (Continued)

Weaker strength 2: Identification, explanation, and example of strength (1), discussion of why it is critical to develop (3), identification, definition, and explanation of course concept (3), how to use the strength as a team leader (3)	10 points		
Concrete plan for how to improve in this area – using SMART goals (must address each of the 5 aspects of SMART goals)	5 points		
Other	**6 points**		
Writing, grammar, flow, organization etc.			
Cited at least two outside scholarly sources, discuss/integrate them well			
Intro, conclusion paragraphs			
	Total		

Unique elements and possible adaptations

The LFS is unique not only because it incorporates proflection, but because cadets receive a copy of the LFS in the mail during the week before their team leader roles commence. Reintroduction of the LFS at this critical point serves several purposes. They are reminded, in their own voices, of how they viewed the team leader role while they were still in their first year at West Point, and they can reflect on their developmental progress. As such, the LFS is a rich proflective writing assignment that can also serve practical purposes to promote leader development and empathy for new cadets.

Instructors at civilian institutions who teach psychology or leader development courses can easily adapt the LFS assignment for a variety of purposes. For example, psychology students in courses anywhere from introductory to advanced undergraduate levels may benefit from proflective writing with regard to their personal development. Students may wish to develop a more optimistic outlook on life, or they may wish to become more humble, grateful, or forgiving as individuals. The LFS offers one possible way that students might engage in the self-development process for direct personal gain, such as leading happier, healthier, or more satisfying lives.

In a leader development course, instructors could use the LFS but direct students to focus on their future leadership roles within their respective institutions. Students have many opportunities to engage in leadership roles during the college experience, where proflective planning could help them become more effective leaders. Some examples include student government officers or representatives, club or honor society leaders, sport team captains, residence hall assistants, peer counselors or tutors, social organization council members, or leaders within youth ministries. The LFS assignment offers broad appeal for instructors and students alike and affords many possible adaptations for use outside of USMA.

Instructors also may wish to collect data on student perceptions of the assignment and/or how completing the assignment has affected the authors. Although a formal assessment of the outcomes of the assignment is not available, feedback on informal course surveys suggests cadets believed the assignment to be valuable and they recommended using it

with future classes. Numerous cadets wrote spontaneous, positive narrative comments in anonymous end-of-course surveys regarding the assignment, and the first author received enthusiastic emails from several cadets shortly after they received the letters in the mail.

Conclusion

The LFS is a practical, engaging, and useful assignment. It encourages students to engage in reflection for the purposes of planning future action, and this proflection can be useful for self- and leader development. Students who enjoy the assignment could potentially make use of it on their own, such as when they anticipate other role transitions in the future. The LFS assignment can easily be adapted for use in different contexts, and the instructor and students might even decide together what would be the ideal time to return the letter back to the students in the future.

10 Harnessing storytelling to improve students' scientific communication

Narrating science

Melissa Eslinger, Jason O. Hoppe, and Peter L. Zhu

Introduction

Introductory science courses at the undergraduate level traditionally approach student learning as a matter of acquiring foundational knowledge; this often involves substantial amounts of lecture as well as directing students to demonstrate their learning by defining key terms or responding in rote ways to narrow prompts. Yet much research suggests that significant cognitive progression requires students to move on from the simple acquisition of foundational knowledge (citing, defining, recalling) to engage in higher-order thinking – acts of understanding, application, analysis, and synthesis.[1] For the most part, introductory courses seem to offer students fewer opportunities to practice such acts, especially relative to upper-level courses, seminars, and capstones.

However, we suggest that guided narrative journaling assignments represent a prime opportunity for students to secure higher-order learning gains in core science courses and beyond. Narrative journaling enables students to understand, apply, and ultimately synthesize foundational material, particularly in introductory core science courses that attract diverse populations with diverse academic interests. In fact we arrive at this conclusion in part by joining our own distinct disciplinary perspectives and levels of expertise: as an undergraduate life science major, an assistant professor of biology, and a director of a cross-curricular writing program and writing center. These diverse yet complementary skill sets and backgrounds endowed us with a unique opportunity to examine the challenges of scientific literacy and laboratory reporting anew.

In contrast to traditional approaches, narrative journaling invites students to relate their material by crafting accounts that render their scientific work meaningful to them, help them better absorb scientific concepts, and ultimately carve room for greater reflection and cognitive growth. Such journaling also makes for richer learning conversations, not only from student to student but between students and their professors as well as students and support specialists often underutilized by science students, such as consultants in campus writing centers. The end result is a more holistic, enduring, and fulfilling learning process that better serves participants at all levels in the scientific community, from novices to fledgling majors, faculty, and research experts.

1 See Lorin Anderson and David Krathwohol, *A Taxonomy for Learning, Teaching, and Assessing: A Revision of Bloom's Taxonomy of Educational Objectives* (New York: Longman, 2001) and Uri Zoller, "Are lecture and learning compatible? Maybe for LOCS: unlikely for HOCS," *Journal of Chemical Education* 70, no. 3 (2001): 195–197.

Comparing approaches: traditional laboratory reporting versus narrative journaling

Traditional laboratory reporting assignments in introductory science courses differ substantially from narrative journaling (Figure 10.1). The former are relatively simple, tightly controlled affairs: faculty first assign readings and a specific protocol for students to undertake in the lab; after completing the lab exercise, students submit brief answers in response to pointed questions in a prompt; lastly, faculty grade students' responses with reference to a strict rubric. The extent of student learning depends inordinately upon the quality of the prompt's design. Yet even at its best, this approach offers few opportunities for the student to perform real synthesis; its lack of structured opportunities for reflection mean that students are unlikely to generate understandings of the scientific process that are meaningful to them or new ideas for further study. Cognitive progression is limited to basic foundational knowledge or technical proficiency: such assignments better support the training of scientific technicians than the education of scientists.

Narrative journaling departs significantly from this approach, enfolding a range of higher-order cognitive tasks from start to finish. Where traditional reporting, at least in the context of introductory courses, is more akin to prompting students to deliver a predetermined solution (a kind of "cookbook science"), narrative journaling frames science as a robust process of discovery. It begins not with providing students a strict laboratory protocol but rather with faculty inviting students to develop their own in response to a realistic or applied experimental scenario. As students then begin their work in the lab, maintaining a narrative journal enables them to record, gauge, and reflect on their activities and progress every step of the way: in digital or physical form, they iteratively consider the experimental design, document and interpret the results, and actively weigh whether their design and approach were valid vehicles to address the salient questions of

Traditional Laboratory Reporting ('Cookbook Science')	**Narrative Journaling** ('Discovery Science')
1. Faculty assign the reading, protocol, and prompt.	1. Faculty present students with a realistic or applied experimental scenario.
2. Students complete an exercise embedded within the given protocol.	2. Students develop a protocol appropriate to the scenario and subsequently collect and analyze data in the laboratory while journaling about their experiment and the scientific process.
3. Students analyze data in order to enter 'short answer' responses to questions specified in the prompt.	3. Students reflect on and interpret the meaning of their results in their journals, considering how results relate to an initial hypothesis and deciding how to characterize their results, whether surprising or expected. *At this stage they may also consult with faculty, peers, or writing center specialists.*
4. Students submit their answers to faculty, which faculty then grade according to narrow rubric, checking for specific data points.	4. Students submit their journals to faculty; faculty grade the assignment by assessing the scientific process as a whole, as represented in the journal. *The path the student has taken is more important than the actual answer.*
5. Faculty return the work to students; students move on to the next assignment.	5. Faculty and students work together to refine a student's understanding of the scientific process (for instance, in relation to a problem statement or experimental approach) or to plot a new direction for student inquiry.

Figure 10.1 Traditional laboratory reporting in comparison to narrative journaling.

the experiment.[2] The journal form also inevitably encourages students to pay more rigorous attention to their own roles and actions across the experimental process. The resultant benefits to faculty are myriad once students submit their journals for review: instead of being constrained to singular, staccato data points that offer limited evidence, at best, as to student understanding, faculty access students' full illustrations of their process – their full paths through an experiment. As a result, faculty are better positioned to pinpoint particular areas of concern and meet students precisely where they are in absorbing the nuances of the scientific process. They can also provide exacting feedback for students to continue, in recursive fashion, the intellectual work of the experiment: for instance, to revisit the experiment if they have made mistakes in executing their approach or interpreting their data. Such feedback can also inspire students who are excelling to formulate new directions for study from results. Either way, the assignment promotes advanced cognitive growth through the application and synthesis of foundational knowledge.

Are there drawbacks to this approach? Admittedly, it risks substantially more design overhead for instructors. Yet that work, and the work that narrative journaling facilitates for students, actually mirrors that of real scientists, whose labors are disproportionately comprised of preparation, analysis, and interpretation. Another potential drawback is added time for grading, given the greater involvement of narrative journals relative to the short-answers of traditional laboratory reporting (customarily evaluated with reference to a simple rubric). Yet faculty can mitigate this concern in several ways: by reviewing journals according to tailored rubrics themselves (focusing on particular aspects of the scientific process); by evaluating student journals selectively or according to specific schedules; or by delegating commenting, review, or even grading to students themselves, whether in individual peer pairings or larger laboratory groups. Indeed, such delegating reduces burdens on faculty time while concurrently increasing senses of student ownership, so long as faculty appropriately scope student responsibilities according to the limits of their disciplinary expertise and other factors. Faculty may also encourage students to schedule sessions at a writing center, yet another avenue for them to receive feedback on the effectiveness of their writing or communications skills. Regardless of how faculty choose to evaluate journals, students benefit from developing and curating them in the first place across the arc of a semester.

An example: traditional versus narrative approaches in a microbiology assignment

What does all of this look like in practice? While important differences exist across distinct scientific disciplines, microbiology provides a good starting point to compare the traditional and narrative approaches (Figure 10.2). In a biology class, a common assignment might involve instructing students to identify microorganisms present within a specified area, requiring students to collect and culture environmental samples on a petri dish. While the temperature gradient and culture media might vary, the simple research question would be "What microbes persist within a particular locale?" Following approval of an experimental approach, students would next collect samples and culture them within the lab, making observations and conclusions. In a more traditional approach, they would respond to specific questions on the quantity or morphology of colonies or even the

2 See Howard Kanare, *Writing the Laboratory Notebook* (Washington, DC: American Chemical Society, 1985).

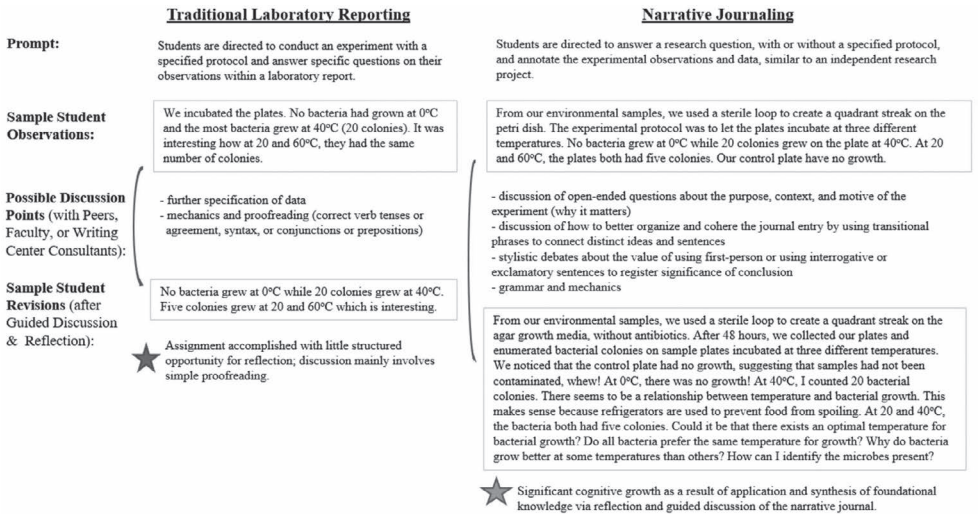


Figure 10.2 An example of traditional laboratory reporting versus narrative journaling in microbiology.

potential for isolate identification. However, journaling allows students to document and faculty to observe the whole scientific process via accompanying diagrams or descriptions; faculty may therein evaluate laboratory habits (i.e., identify contamination), provide feedback, and devote attention to problematic areas. Such an approach emphasizes the path or process of science rather than the state function afforded to specific, predetermined questions and answers.

The limitations of the traditional approach are immediately apparent in the greater brevity of student response it encourages (Figure 10.2). All we know from the traditional response is that the student has presented data. Absent is any indication that the student would be able to answer questions such as, "What is my data telling me?" or "What is the experimental approach, and is that approach appropriate to my research question?" Though the traditional sample response adheres to scientific conventions of avoiding first person and passive voice, the syntax is repetitive and rigid, lacking fluidity and nuance. One could argue that the traditional approach yields a much more streamlined results section than the narrative approach, yet at what cost to the learner's development? Such bare bones expression is also far from the real work of scientists, who must reason through and provide context for their conclusions. That the traditional approach also negatively constrains the further learning conversations students might hold with each other, faculty, or writing center consultants is also clear. Not much can be done other than proofreading: there is simply less material to digest, comment on, and develop – and therein little incentive for the student reflect or roles for other interlocutors to play.

By contrast, a journaling approach enables students to contextualize the results within the broader scope of the experiment and learning objectives of the course as well as invite others into a learning conversation. It requires students to reckon with and *explain* the meaning of their work, becoming authors who bring their numbers and data to life by accounting for the significance and relationship of their results to the rest of the experiment.[3]

3 See Roald Hoffman, "Research Strategy: Teach," *American Scientist* 84, no. 5 (1996): 20–22.

As Figure 10.2 illustrates, the journaling approach emphasizes creating transitions, constructing logical conclusions, and posing questions to further application and synthesis of foundational knowledge. In so doing, journaling opens the door to a full range of learning conversations – not just mechanical proofreading but critical discussions of substance, organization, and style in the context of core disciplinary questions. In the end result – the revised journal entry – the student's results grow clear by virtue of being framed in the context of a narrative that explains the relationship between the data points and also addresses the data's implications in relation to the research question. Such work enables the student's data to stand alone, as it were, and become readily comprehensible for outside audiences. In the end, journaling habituates students to proper scientific notekeeping, useful not only for academic work but future medical or industrial (e.g., patent) purposes.[4] An important caveat, though: it is not that more words are always better; lexical precision is what matters most. It is the precision and coherence of the writing in the journaling example, facilitated by critical conversations at the writing center or elsewhere, that outdoes the traditional method – not the word count.

Indeed, the value that undergraduate writing centers bring to the process lies in part on the ground that writing centers have long stressed higher-order learning over lower- or later-order concerns with grammar and mechanics.[5] As seen in the traditional method of addressing the prompt, students who provide curt, declarative sentences limit the potential feedback from the writing center to rudimentary proofreading; nothing can be done to help the student to further integrate their knowledge into the broader aims of the course. By contrast, a narrative journaling approach better aligns with writing center principles designed to support the development of writers and thinkers, instead of merely polishing final products. As Figure 10.2 makes clear, in narrative journaling assignments, even generalist consultants – usually writing center staff have backgrounds in the humanities – are equipped to ask generative, clarifying questions designed to help students better organize ideas, enhance transitions, synthesize knowledge, and grasp the true meaning of their conclusions. However, West Point's Mounger Writing Center departs from this norm; nearly half of its undergraduate peer consultants, who staff the center as Cadet Writing Fellows, major in a field within math, science, or engineering, making a narrative approach all the more relevant to peer-to-peer learning.

Conclusions and other applications

The standard laboratory report consists of clearly defined sections (introduction, methods, results, discussion). When novice student scientists are provided with standardized laboratory reporting templates, they fail to grapple with scientific writing in any meaningful way: they fill in the content but fail to understand the greater form. Yet asking them to write whole formal reports is no solution to this issue: often students who are still learning how to write lab reports will be criticized by their instructors for mistakenly intermingling content in different sections or even corrected for crafting transition sentences between sections, as though the report were an essay. Students may have accurate

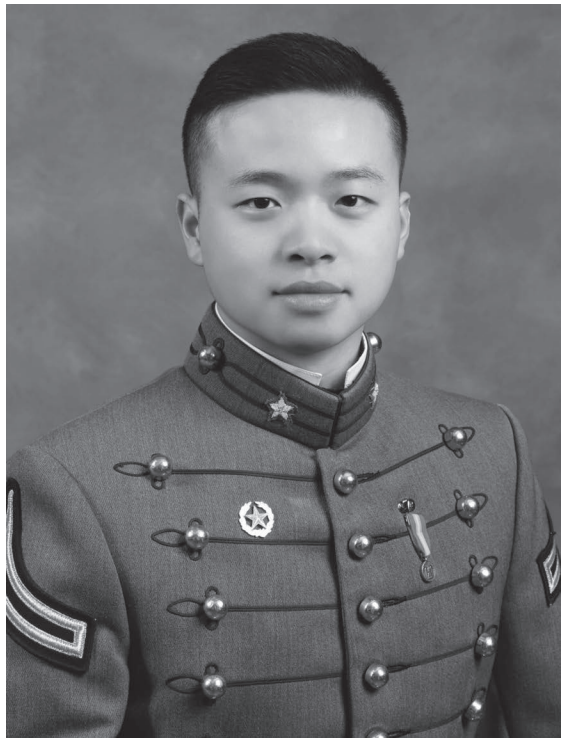
4 Kanare, *Writing the Laboratory Notebook*.

5 On writing center orthodoxies, see Stephen North, "The Idea of a Writing Center," *College English* 46, no. 5 (1984): 433–446; Paula Gillespie and Neal Lerner, *The Longman Guide to Peer Tutoring* (New York: Pearson, 2008); Lauren Fitzgerald and Melissa Ianetta, *The Oxford Guide for Writing Tutors* (New York: Oxford UP, 2015).

content but still produce a disjointed product. The document as a whole loses its cohesiveness and persuasive value. It is left up to the reader, whether a learner or expert in the field, to fill in the gaps of the lab report and establish the linkage between the sections. By contrast, narrative journaling bridges otherwise separate sections to reflect a cohesive narrative, manageable for novice or inexperienced undergraduate scientists yet developmental in orientation and accessible to an outside audience (whether a writing center consultant or faculty instructor).

Though the example we provide here is from a course in biology, narrative journaling is an approach that can be useful across different disciplines – and wherever we seek for our students to perform higher order cognitive acts.[6] Not only can writers in the scientific community utilize a narrative technique to improve their writing, but policymakers, businessmen, and even military strategists can implement a narrative style in their writing to improve their communication skills and preserve historical progress. For students in science courses learning the art of scientific writing, the narrative approach is particularly important to promote their conceptual comprehension, ability to contextualize numbers and data, and ultimately to improve their ability to communicate their results. Establishing a narrative style of writing during the learning stage will enable students to become future experts and academics better equipped to communicate to a wide variety of audiences.

In Memoriam: 2LT Peter Leping Zhu



6 On working across the disciplines, see Barbara Walvoord, *Helping Students Write Well: A Guide for Teachers in All Disciplines*, 2nd ed. (New York: MLA, 1986).

Second Lieutenant Peter Leping Zhu (1997–2019) personified the values of the United States Military Academy. A first-generation Chinese American and first-generation service member, a Stamps Scholar and Rhodes Finalist, a Senior Writing Fellow and President of the West Point Pre-Medical Society, Peter was among the top cadets in his class by every measure – academically and militarily. As a life science major with a passion for behavioral health, he aspired to a lifetime of service as an Army physician-scientist, and he became the first cadet in the history of the academy to gain direct acceptance into an MD-PhD program, at the Uniformed Services University School of Medicine and Health Sciences. Ultimately, Peter epitomized the very best of West Point; as an ambitious, innovative, and empathetic leader who pursued excellence and service to others in equal measure, he continues to inspire us all.

11 Leadership in combat writing assignments – *in extremis*

Brian J. Reed and Nicole Kruse

The course objective for *PL471: Leadership in Combat* is to provide an advanced study of leadership in the Army profession – leading soldiers during times of imminent physical danger as combat leaders. This course provides cadets with new knowledge via behavioral and social science theory and research discussed in the context of combat. At the end of the course, cadets are better prepared to demonstrate leadership in combat environments because of a greater understanding of human behavior in *in extremis* situations.

Throughout the course, cadets receive feedback on their ideas regarding leadership in general and specifically in the context of *in extremis* environments. They also have an opportunity to reflect on others' experiences of leading in combat. The purpose of the course assignments is to assess theoretical learning and provide for integrative learning experiences. Combined, these assignments offer cadets the opportunity to develop as leaders.

This is a 30-lesson course taught in 75-minute class periods. The course is divided into three major areas and is designed to first provide a theoretical foundation for understanding human behavior in combat and then to explore some of the factors that influence combat leader(ship) effectiveness.

1. Area I (*Intra-personal Leadership: Understanding the Combat Environment and Effects on Leadership*) – The purpose of this area is to help cadets gain an understanding of the behavioral and social science concepts needed to effectively function in the stressful and chaotic environment of combat. Several of the main concepts are fear, courage, stress, death, killing, obedience and personal responsibility, decision making, and making meaning of combat experiences.
2. Area II (*Interpersonal Leadership: Influencing Others in Combat*) – The purpose of this area is to expose cadets to various behavioral and social science theories and techniques for influencing others in combat. In this area, cadets explore how to build and maintain cohesive and resilient combat units, how to earn soldiers' trust, motivation, and building a culture to excel and win in *in extremis* environments.
3. Area III (*Call to Action – Combat Leadership: Learning from Others*) – The purpose of this area is to provide cadets with the opportunity to delve more deeply into the nature of combat leadership. Cadet-led and facilitated case study discussions and combat leader presentations are the foundation for this area, providing the cadets with real-life applications to illustrate the linkage between theory and action.

There are three required textbooks for this course and several required readings. There are also three recommended books as supplementary readings.

Required textbooks

Sledge, E.B. *With the Old Breed* (New York: Presidio Press, 1981).

Sweeney, Patrick J., Michael D. Matthews, and Paul B. Lester. *Leadership in Dangerous Situations: A Handbook for the Armed Forces, Emergency Services, and First Responders* (Annapolis, MD: Naval Institute Press, 2011).

Tapper, Jake. *The Outpost: An Untold Story of American Valor* (New York: Little, Brown, 2012).

Additional required readings (distributed to class)

Company Command. "Leadership and the Death of a Soldier." *Army*, July 2006, pp. 63–65.

Company Command. "Leading Our Soldiers After They Lose One of Their Own." *Army*, January 2008, pp. 47–51.

Dinh, Julie V. and Eduardo Salas. 2018. "Steering Through the Storm." *People and Strategy* 41(4): 56–61.

Ender, M.G., P.T. Bartone, and T.A. Kolditz. "Fallen Soldiers: Death and the U.S. Military." In C.D. Bryant (Ed.). *The Handbook of Thanatology: Essays on the Social Study of Death* (San Francisco: Sage, 2001), pp. 544–555.

Grossman, D. *On Killing: The Psychological Cost of Learning to Kill in War and Society* (Boston: Back Bay Books, 1996).

Kellett, A. *Combat Motivation: The Behavior of Soldiers in Battle* (Boston: Kluwer-Nijhoff Publishing, 1982).

Ritzer, George. *The Blackwell Companion to Major Classical Social Theorists* (Malden, MA: Blackwell Publishing, 2003).

Wong, Leonard. *Why They Fight: Combat Motivation in the Iraq War* (Carlisle, PA: Strategic Studies Institute, 2003).

Recommended books

Bowden, Mark. *Blackhawk Down* (New York: Signet Books, 1999).

Moore, Harold G. and Joseph L. Galloway. *We Were Soldiers Once . . . and Young* (New York: Random House, 1992).

Parnell, Sean and John Bruning. *Outlaw Platoon* (New York: HarperCollins, 2012).

Van Camp, Jason B.A. and Andy Simmons. *Deliberate Discomfort: How U.S. Special Operations Overcome Fear and Dare to Win by Getting Comfortable Being Uncomfortable* (Washington, DC: Ballast Books, LLC, 2020).

The two major assignments in the course are the midterm exam and the final paper.

1 *Midterm exam*: This is an in-class, closed book exam. This exam assesses class preparation, as well as an understanding and retention of relevant course concepts and behavioral science theories. This exam is multiple-choice, true/false, fill-in-the-blank, and/or short answer.
2 *Final paper*: For this integrative paper, cadets read the book *With the Old Breed*, by E.B. Sledge. (Note: Any book on *in extremis* experience would suffice.

An example is Allison Levine's book *On the Edge: Leadership Lessons from Mount Everest and Other Extreme Environments*.) The purpose of this paper is for cadets to apply course concepts to vignettes from the book and think about how they will incorporate these concepts into their own leadership. Cadets select four course topics – two from Area I and two from Area II – and apply these concepts to four different vignettes from the book. Amplifying guidance is as follows:

a *Identify* (indicate the course topic) and *describe* (give a detailed account of the concept – an expanded definition).
b *Summarize* a leadership vignette/example from the book.
c *Analyze* the vignette using the selected course concept. Explain how the concept applies (using the language of the theories).
d *Identify* leadership lessons from this vignette related to the selected course concepts and explain how to put these leadership lessons into practice.
e Complete steps a–d for four different vignettes and four different course topics – one concept per vignette.
f This paper is 8–10 double-spaced pages, 1-inch margins, Times New Roman 12 font.

There are other graded events that assess the cadets' retention of course material and allow them to demonstrate their learning in a presentation and discussion. These assignments are designed to allow for reflection and an application of the theory to real-life experiences.

1 *Combat leader presentations*: For this presentation, cadets are required to select a combat leader or an *in extremis* leader. The cadet will explain why they selected this leader and explain the leader's combat or *in extremis* action. The cadet is required to demonstrate mastery of course concepts by connecting the course material to the leader's combat action – theory to action linkage. See Enclosure 1.
2 *Case study discussant*: This is a cadet-led and facilitated discussion on the book *The Outpost*, by Jake Tapper. (Note: Similar to the final paper, any case study or book on an *in extremis* experience or situation will suffice. An example is Brendan McDonough's book, *Granite Mountain: The Firsthand Account of a Tragic Wildfire, Its Lone Survivor, and the Firefighters Who Made the Ultimate Sacrifice*.) The purpose is to bring to life the course concepts in a relevant and meaningful way using the combat actions of several units over time in Afghanistan. All cadets are expected to read the entire book, not just their assigned sections. There are three separate books inside the larger book, *The Outpost*. Each sub-book is focused on a specific unit, during a specific timeframe, in generally the same area of Afghanistan. Cadets are organized in groups of 6–7 cadets by sub-book for a total of three groups. Each group has two class periods to guide a discussion on various vignettes within their specified book tied to course concepts and lessons learned. See Enclosure 2.

Enclosure 1: Combat leader presentation assessment and feedback sheet

Cadet: _____
Date: _____ **Combat Leader:** _____

E	MS	NI	U	
__	__	__	__	Explanation of why you selected this leader
__	__	__	__	Clear explanation of the leader's combat/*in extremis* action
__	__	__	__	Connection of course material to the leader's action(s) – theory to action linkage
__	__	__	__	Demonstrated mastery of the course concepts
__	__	__	__	Creative use of outside material
__	__	__	__	Level of preparation/effort
__	__	__	__	Confidence and presentation skill
__	__	__	__	Summary of what you learned about leadership in combat from this leader
__	__	__	__	Encouraged creative, innovative, & critical thinking/questions/ participation
__	__	__	__	Listened to students' responses and used them to further class discussion

General Comments:

Grade: _____/ 150

Note: E = Excellent (15 or 14 pts), MS = Met Standard (13 or 12 pts), NI = Needs Improvement (10 or 11 pts), U = Unsatisfactory (9 pts and below)

Enclosure 2: Case study discussant

Cadets are assessed on the following criteria over the two class periods. The assessment and grade are complete after the second class period for their assigned discussant group. *Each criterion is worth 15 points, for a total of 150 points.*

_____1 Clear identification of the lesson objectives.
  a What is it that we want to achieve?

_____2 Provide an overview of the larger fight/environment.
  a Set the context – frame the big picture in which the vignettes fit.

_____3 Clearly identify the key players and provide understanding of their roles.
  a This should include a discussion of all key players – US and Afghan – and create a common understanding of their position and responsibilities.

_____4 Use of sequential, multiple vignettes – clearly explained – from the book.
  a The use of the vignettes needs to be sequential, as they chronologically occurred.
  b "Tell the story" of the vignette to create common understanding.
  c What compelling topics, points of tension, or potentially surprising or counterintuitive insights stand out in the vignette?

_____5 Application of course concepts.
- a Do not become solely focused on one or two concepts – breadth and depth.
- b Clearly articulate the theory to action link – explain the concept and how it applies to the vignette.

_____6 Facilitation of class or small group discussion.
- a Stimulate cadets to think beyond this specific class period and develop insights through linkages across other lessons, courses, experiences.
- b Cadets are engaged in, energized by, and challenged by the class discussion.
- c Follow-up questions to motivate cadets to think beyond their initial contributions.

_____7 Summary of key lessons learned.
- a What are the main takeaways – what did you learn about leading in combat?

_____8 Discussion of how you will put the lessons learned into practice as an officer.
- a Integrate the concepts and internalize the takeaways by linking key learnings to previous personal experiences or ones cadets will potentially face as officers.

_____9 Use of maps, slides, videos, etc., to amplify the presentation and facilitate the discussion.
- a Should be additive, not "in place of" the presentation.
- b Do not over-rely on audio-visual aids.

_____10 Everyone in the discussant group contributes

12 The Intellectual Giant Model of teaching

Sharpshoot, integrate, and apply

Everett S. P. Spain

Introduction

In 2003, educational researcher George Kuh wisely acknowledged that "(students') engagement helps to develop the habits of mind and heart that enlarge their capacity for continuous learning and personal development."[1] Even though West Point cadets (undergraduate students) are required to be present for all of their assigned academic classes, their individual levels of cognitive engagement and, correspondingly, their amount of learning are ultimately their decision.[2] Since West Point's mission statement includes educating, training, and inspiring cadets to serve as an Army officer upon graduation, typically as a platoon leader who is directly responsibility for the training, readiness, health and welfare of 20 to 40 combat soldiers in both peacetime and wartime, the quality of the cadets' engagement, and thus their overall education, may have significant consequences on others. To facilitate our cadets' decisions to engage and learn in the academic classroom so that they are as prepared as possible to successfully lead as U.S. Army officers, the Intellectual Giant Model (IGM) fosters student engagement and motivation to learn.

Literature review

A 2005 study demonstrated that college students' level of participative engagement predicted their educational outcomes, including both midterm and final examination grades.[3] Prior research has shown that college student involvement (engagement) is driven by several factors. These include students' propensity to engage in academic skills (e.g., preparing for class/assignments), performance engagement (e.g., desire to get good grades, being confident in academic ability), emotional engagement (e.g., applying the course material to my life), and participation/interaction engagement (e.g., raising hand, asking questions in class, having fun in class, actively participating in small group activity, and helping fellow students).[4] It follows that courses taught using pedagogical models

1 Kuh, George D. "What we're learning about student engagement from NSSE: Benchmarks for effective educational practices." *Change: The Magazine of Higher Learning* 35, no. 2 (2003): 25.

2 Pintrich, Paul R., and Barbara Schrauben. "Students' motivational beliefs and their cognitive engagement in classroom academic tasks." *Student Perceptions in the Classroom* 7 (1992): 150.

3 Handelsman, M. M., W. L. Briggs, N. Sullivan, and A. Towler. "A measure of college student course engagement." *The Journal of Educational Research* 98, no. 3 (2005): 189.

4 Handelsman, M. M., W. L. Briggs, N. Sullivan, and A. Towler. "A measure of college student course engagement." *The Journal of Educational Research* 98, no. 3 (2005): 187.

that deliberately catalyze one or more of these types of student engagement will catalyze higher performing (higher learning) students.

Additionally, research has shown that a student's friends' academic performance predicts his or her own academic performance.[5] Knowing students often make friends with their fellow students, this means that student achievement (or lack thereof) is contagious. If students' cognitive engagement predicts achievement, perhaps students' engagement (or lack thereof) is what is contagious.

Background

At West Point, many courses are taught using the Thayer Method, named after Colonel Sylvanus Thayer, the early superintendent (college president) who is widely considered to have turned West Point into a premier educational and leader development institution. The first step of his framework includes students studying (preparing) the assigned lesson prior to class.[6] The second phase takes place in the classroom, where the teacher facilitates an environment so that students can apply their new knowledge to theoretical or real-world problems, thereby anchoring their learning. It follows that the better the students' preparation and classroom engagement, combined with skilled teacher facilitation, the better the learning.

The creation of the IGM was motivated by three factors – my inability as a college undergraduate to remain engaged in most academic classrooms, an unlikely teacher facilitating a remarkably engaging classroom, and a peer sharing an inspirational term of endearment about engaged cadets. As a West Point cadet, I was often physically tired while in the classroom, struggling to pay attention and engage. Likely due to intermittent attention, I rarely understood how the current lesson in the course was synched to previous lessons in any significant way, thereby missing any chance for course coherence and integration. Finally, I yearned to understand how the ideas being discussed in class applied to a future life as an Army officer. This motivated me to vow that if I were ever to become a teacher, I would create a learning environment that engaged its students.

Thankfully, there was a glimmer of hope through an unexpected source, Ronald Pike, Visiting Professor of Chemistry from Merrimack College, just north of Boston. In addition to being both my first nonmilitary professor at West Point (there are now many civilian professors on West Point's faculty) and the author of our class textbook *Microscale Organic Chemistry*, he led a most engaging class on what many could consider a quite unengaging topic. For example, he would draw an organic compound on the chalk board, draw a plus sign, draw another compound next to it, and perhaps add something like heat as well. He would then ask the class, what would the ensuing reaction be? The class would offer a few predictions of the outcome, and he would take the top two and write them on the board. With a smile, he would then ask each student to vote which

5 Altermatt, Ellen Rydell, and Eva M. Pomerantz. "The development of competence-related and motivational beliefs: An investigation of similarity and influence among friends." *Journal of Educational Psychology* 95, no. 1 (2003): 118.

6 Shell, Amy E. "The Thayer method of instruction at the United States Military Academy: A modest history and a modern personal account." *Problems, Resources, and Issues in Mathematics Undergraduate Studies* 12, no. 1 (2002): 29. DOI: 10.1080/10511970208984015. Paredes, Julia, Richard L. Pennington, David P. Pursell, Joseph Sloop, and Mai Yin Tsoi. "Engaging science students with handheld technology and applications by revisiting the Thayer method of teaching and learning," *Georgia Journal of Science* 68, no. 2 (2010): Article 10: 186.

prediction was more likely to be true, and why. As we voted, he would write our initials under the header that listed that possibility. Arguments ensued. Alliances formed. It was fun. Regardless of who was right, we learned. The students spent more time interacting and got to be better friends. The IGM is an attempt to imitate Professor Pike's active-facilitation style of a flipped classroom, where students are intellectually engaged.

The name *Intellectual Giant* was inspired by stories several cadets told me about a West Point teacher of physics several years ago. Whenever a student made an insightful comment or otherwise significantly contributed to in-class learning, the teacher would call him or her "brilliant scientist!" The receiving students were inspired by this term of endearment to intellectually engage even more. This inspired me to design a classroom where intellectual engagement and "brilliant scientists" were the norm. His "brilliant scientists" became my "intellectual giants."

The IGM is a foundational learning framework I employ for two of my current courses, PL300: Military Leadership, a 3.0 semester hour upper-level undergraduate core course for all USMA cadet juniors, and LD740: Leadership Development, a 3.0 semester hour graduate-level integrative course for the Eisenhower Leadership Development Program (ELDP). The ELDP students are primarily active-duty Army captains preparing to become USMA cadet company tactical officers, who will serve as the legal supervisors for one of the 36 cadet companies.

The Intellectual Giant Model (IGM)

The IGM's three foundational steps are to ask students to (1) *Sharpshoot* (criticize and improve) the theory of the day, (2) *Integrate* or contrast the theory of the day with theories previously taught, and (3) *Apply* the theory of the day to their current or future leadership responsibilities.

Step 1: Sharpshoot the theory

Most people would consider West Point cadets to be leaders already. Indeed, most cadets have served as a leader throughout their youth, whether it be as sports and academic team captains in the high school, student club leaders, student government representatives, or Scouts, etc. Also, by the time they are cadet juniors, all of them have served as cadet team leaders (supervisors of 1–2 others) for at least two semesters and many of them have served as squad leaders (supervisors of 6–12 others) during extended periods of rigorous summer military training. With these challenging leadership experiences under their belts, the cadets are confident in their knowledge of the subject. Also, many of us who teach leadership-related topics have heard the question, "Can you really teach leadership?" On my first day of teaching cadets about leadership, it was clear that many of the cadets already consider themselves experts. Since most of them were leaders in their communities, athletics, and academics before coming to West Point, and all of them have had at least two major leadership positions by the time they got to the course, this self-serving bias had some validity.

That observation became a reality at the start of my first teaching year with a cadet named Ollie. Over the first couple of classes, Ollie had been very active in class discussion, although he gave off the impression that his edgy enthusiasm could easily devolve into disruption and disrespect. During our class's third meeting of the semester, I wrote the behavioral science theory of the day on the classroom's large front whiteboard. Without any provocation, Ollie raised his hand, and when called, offered "Well, that's not how it

works in real life." Instead of arguing with him, I held the dry end of the uncapped pen out toward Ollie and asked him to come up to the front of the room. I asked him if he would use his creativity and analysis to specifically improve the theory by editing it in front of the class, which he did with some encouragement and patience from me. Every member of the class was watching Ollie with keen interest. He scratched a part of the original theory out and added something else. Then he turned to the class and explained why he believed his modification improved the theory. The other cadets loved it, and so did I. Our class quickly embraced the rallying cry of, "Never fully believe the theorists or the teacher; if we work at it, we can come up with better ideas on our own." And the first step of the IGM was born.

This sharpshooting developed into a normal activity. With approximately 15 minutes left in a typical class, I project the theory of the day on the front whiteboard and ask the students to talk to a classmate sitting next to them to come up with two specific ways to improve the theory. As they think and discuss in their two-person group, I rhetorically ask the class several questions. First, can they shorten the theory by removing inconsequential parts of it, joining similar components, or simplifying the language or image? Next, is the original theory missing something critical, and if so, what is it and how should they add to it? Finally, is the theory most effectively displayed or ordered – are the most important things first?

After the cadet teams discuss this for two to three minutes, each team chooses their most impactful improvement and sends one of the two team members up to the front to physically change the theory, using a similarly colored marker (e.g., red). Each team's modification requires a brief verbal justification to the rest of class. And students are welcome to erase or modify their classmates' edits. During pauses, when the pens are not flowing, I typically challenge students with "Simpler theories are often better theories," and/or "What big things is this theory not accounting for?" After all of the student teams have modified the original theory (see Figure 12.1) and defended their changes, the class

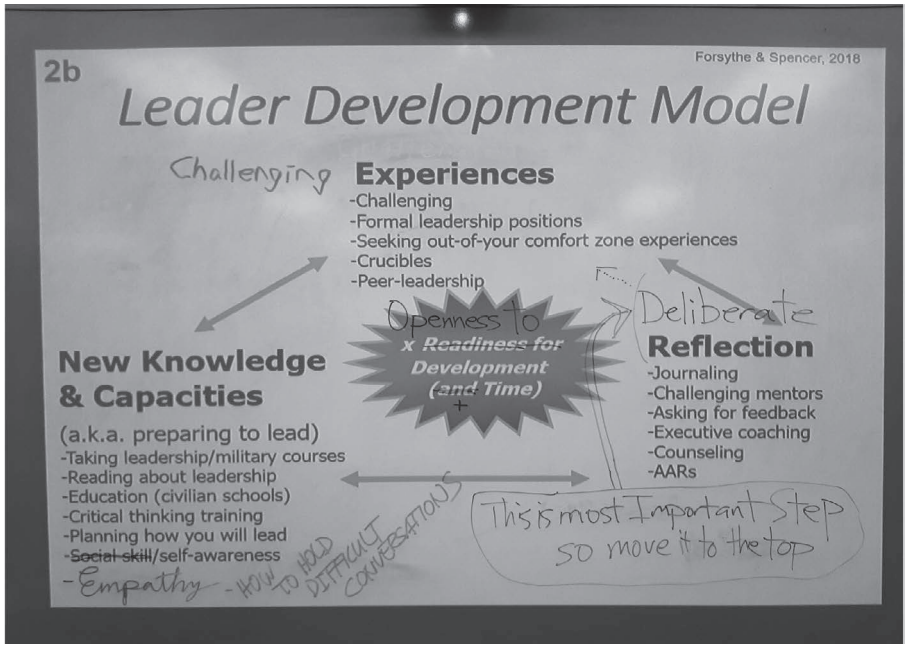


Figure 12.1 A theory of the day after cadets conducted Step 1 of IGM (sharpshoot the theory).

discusses whether the overall improved version is significantly better than the original, and why. This question brings humility and engagement to the learning process.

Benjamin Bloom's *Taxonomy of Educational Objectives* includes knowledge (recall memory), comprehension, analysis, and evaluation.[7] Looking closely at a theory to find its strengths and weaknesses facilitates each of Bloom's objectives. No longer was I telling students or passing along strictly what other authors told them about theories on how they should act as leaders. Now the students were engaging and improving theories themselves, which is learning.

Step 2: Integrate the theory with previous theories

Dee Fink posited that the integration of ideas is critical to significant learning.[8] Indeed, the second step of the IGM is to ask the cadets to integrate the theory of the day with theories previously taught in the course. Cadets sit back with their same partner and spend 2–3 minutes coming up at least two theories previously taught in the course that relate to the theory of the day. Again, they are welcome to use their notes and class text. Similar to asking questions to catalyze the sharpshooting (Step 1), I'll ask them a series of questions to enable their thinking. First, are there any subcomponents of the theory of the day that match or are similar to subcomponents of previous theories we studied? Next, are there conditions/contexts needed for the theory to apply that are similar to the contexts required for any previous theory? And, finally, does the theory of the day present any ideas that are contrary to the ideas from previous theories?

At this time, to keep the cadets' attention focused on integrating theories, not on the less valuable (but still productive) mental drill of trying to remember the various theories taught in previous lessons, I simultaneously display an easy-to-read list of the course's previous theories. As soon as I ask them to begin Step 2 (integrate), their eyes alternatively switch back between the modified theory of the day and the list of the other major theories of the course, contrasting and comparing. Inevitably, just a few seconds later, several of them come up and, using a different colored marker than during the previous step (e.g., now using blue), annotate the similarities or differences between the theory of the day and several previous theories. If the total amount of written additions from Step 1 (sharpshoot) is already reaching the point of distraction, I'll ask the cadet teams to not write their comments on the theory of the day itself but instead to make simple list of theories that integrate (or conflict) near one of the corners of the whiteboard (see Figure 12.2). The integration process takes active monitoring. Without a facilitator's active encouragement, some students will do "theory drive-bys," where they list the name of previously taught theories but do not do the harder but more fruitful work of integrating the theory of the day's subcomponents with the previously theories' subcomponents.

Step 2 (integrate) is especially powerful when applied during integrative and capstone courses. The master's-level course that I currently teach is an integrative course, responsible to tie together the 14 other courses in the program. As such, in addition to asking students to identify several integrations (or contrasts) with other theories taught so far in my course, I also ask them to find integrations or contrasts with theories taught in other courses in the program.

7 Bloom, Benjamin S. *Taxonomy of Educational Objectives. Vol. 1: Cognitive Domain* (New York: McKay, 1956), 20–21.
8 Fink, Dee L. *Creating Significant Learning Experiences: Revised and Updated* (San Francisco: Jossey-Bass, 2013), preface.

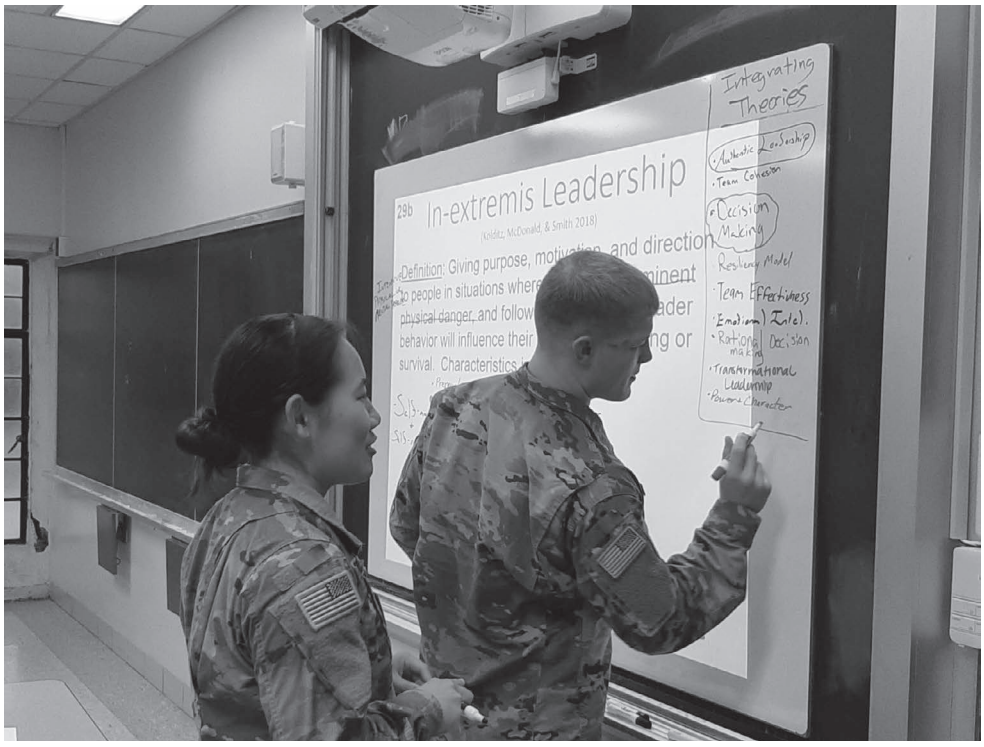


Figure 12.2 Step 2 in IGM (integrate the theory of the day with theories previously learned in the course). Note that the subcomponents of these additional theories were not listed in the photo due to space concerns but were a requirement of the class discussion.

The IGM's Step 2 (integrate) facilitates the students making connections between the lessons and builds a coherence across the course. It also reduces the need to do course reviews or brief discussions of previous lessons.

Step 3: Apply the theory to their current or future lives

In addition to the objectives pursued through the IGM's Steps 1 and 2, Bloom's Taxonomy also includes *application*.[9] Therefore, the IGM's final step is to ask the students to come up with several specific ways to apply the theory (or, preferably, their improved version of the theory) to be a better leader today or in their future professional roles as an Army platoon leader (see Figure 12.3). When they give examples, I push them to be as specific as possible. When necessary, I either share a brief personal story or observed experience where I (or another leader) successfully applied (or failed to apply) the theory of the day and the outcome. As the third step in the IGM process, it facilitates a third anchoring of their new knowledge as they prepare to apply it in the future.

9 Bloom, Benjamin S. *Taxonomy of Educational Objectives. Vol. 1: Cognitive Domain* (New York: McKay, 1956), 20.

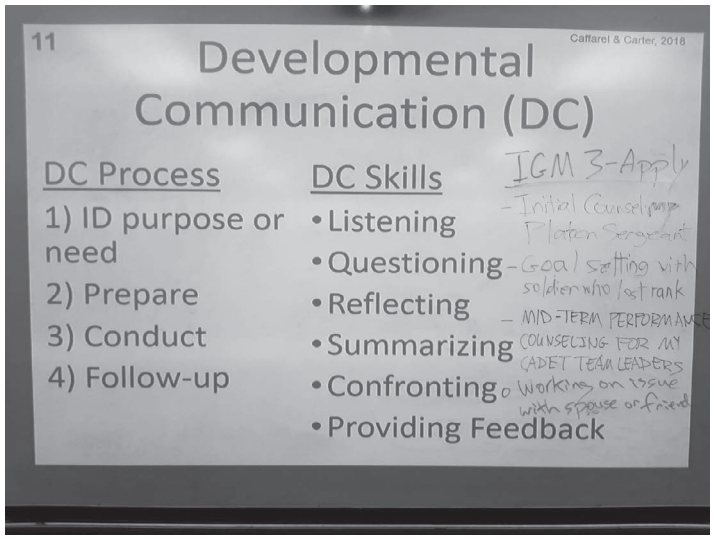


Figure 12.3 After Step 3 in IGM (apply to current or future leadership roles).

Analysis and results

To understand more about the effectiveness (or lack thereof) of the IGM, I surveyed the 45 West Point cadets who experienced the IGM during either the current (AY 20–1) or previous academic year (AY 19–1), and 15 cadets responded ($N = 15$), for a 33.3% response rate. I asked them whether the IGM and each of its three steps contributed to their learning (or not). A strong majority of cadets surveyed felt the overall IGM contributed to their learning and was more effective than typical class discussion. Similarly, a strong majority of cadets believed each of the three IGM steps contributed to their learning (see Table 12.1).

Table 12.1 Perceptions of the Intellectual Giant Model

Question	*N*	*mean*	*std dev*	*affirmative*	*negative*
The IGM contributed to my learning in the course	15	4.47	0.92	13	2
The IGM's Step 1 (sharpshooting) contributed to my learning	15	4.67	1.29	12	3
The IGM's Step 2 (integrating) contributed to my learning	15	4.53	0.99	13	2
The IGM's Step 3 (applying) contributed to my learning	15	4.53	1.13	13	2
The IGM contributed to my learning more than typical class discussion	15	4.27	1.33	12	3

Note: The cadets were asked to respond using a six-point Likert scale with 1 = strongly disagree, 2 = disagree, 3 = slightly disagree, 4 = slightly agree, 5 = agree, and 6 = strongly agree. Responses of 6, 5, and 4, were coded as "affirmative," and responses 3, 2, and 1 were coded as "negative."

Example affirmative responses from students include:

> The IGM assisted students in truly understanding the core concepts of the lesson and drove the course topics on a day-to-day basis. It made class time more useful and contributed to learning.
>
> [The IGM] helped relate the theory of the day to other things we had learned, which helped the course not end up confusing and overwhelming over the course of the semester.
>
> [Step 3 (apply)] was the most useful because it was easiest to relate to whether we had our own experiences, our classmates had experiences, or even our instructors shared experiences. It put the theory into perspective and how we should shape our leadership due to this.
>
> [The IGM] was a way that I learned most of the things I did in PL300 because it was simple, yet it helped us break the theory down from understanding the basic verbiage of the theory, to comparing theories, to using the theory in our lives.

Example negative responses from students include:

> I didn't find value in sharpshooting the theory of the day. It felt like we were just nitpicking the model.
>
> I understand the point is to fully integrate all of the lessons, but I feel like it took time away from focusing on the new theory.
>
> I don't know that it contributed to learning in the course per se. It was often some good discussion, but more like imparting wisdom. Maybe in some ways that is like learning, but it is less like learning for the tests and essays.

As part of the analysis, I also checked to see if cadets' academic GPA would predict their perception of the efficacy of the IGM. So, I compared the responses of the cadets in the top half of their class academically (academic GPA > 3.0) to the rest of their class and found there was no statistically significant difference in the two groups' perception of the efficacy of the IGM.

Future thoughts, considerations, and limitations

Considering some of the negative responses about the IGM and my own observations in class, there are certainly ways to improve the IGM. Too many hand-written edits on the projection of the theory of the day can be distracting. Going into a new semester, I might reduce this by having each student group first share their ideas with another group to come up with a single and better refined improvement for Step 1 (sharpshoot). Similarly, for Step 2 (integrate), cadet teams could pair up and share only one of their theories. Additionally, they could write it on the side of the theory and not on/within the actual theory itself. Also, when the theory of the day requires more class time for discussion or application and there is not a lot of time to apply the IGM, I could simultaneously assign one-third of the class to work on Step 1, one-third to work on Step 2, and one-third to work on Step 3, and then have each group share their highlights.

To date, the IGM has been primarily applied in social science classrooms, where theories predicting individual and organizational behavior are just that, theories. Indeed, social science theories' confidence intervals lend themselves to debate and criticism. It follows

that the IGM would apply fully to humanities, which also revels in debate. Yet for teachers of the hard sciences, sharpshooting the law that governs when water will boil may be less fruitful, because water boils 100% of time it reaches 100° Celsius at one standard atmospheric pressure. A STEM teacher can still apply the spirit of the IGM, which is to actively facilitate the intellectual engagement of the students by asking them to think deeply about the theory of the day, defend their thoughts while hearing others', and envision how they can apply the theories learned in their future professional lives. Perhaps three questions for applying the IGM to a hard science or engineering theory could be: (1) What does this theory not answer that is also important? (2) How is this theory similar and different to related theories? and (3) What are creative (not obvious, yet potentially impactful) ways that I could apply this theory to my future role? It is also important to consider that many college students enter STEM courses with much less confidence and tacit knowledge than in social sciences courses such as leadership. If the teacher takes time to share a few anecdotes (or data) of how applying the modified IGM in STEM can build the students' knowledge and confidence significantly more than relying solely on traditional lectures and laboratory exercises, students' enthusiasm for learning will likely increase in kind.

Conclusion and future study

College students make daily decisions of whether to intellectually and emotionally engage in class. By thoughtfully applying the IGM, a teacher has the potential to catalyze his or her students' level of engagement and learning. Future research could conduct an experiment to test actual outcomes. A teacher who teaches four sections could employ the IGM in two randomly selected sections (treatment group) over the course of a semester and not apply the IGM in his or her two other sections (control group) of the same course. The performance results of the two groups, controlled for any cadet and environmental differences, could then be compared.

Teaching notes

Morten G. Ender

The 14 teaching and learning notes included in this section provide empirical evidence of in and outside class activities. Teaching and learning notes are shorter, less comprehensive descriptions of pedagogical applications in specific disciplines. The notes cover a range of disciplines beginning with a foreign language and arts assignment. Other disciplines and topics include simulations in psychology and engineering, leadership lessons through film and coaching, encouraging participation and engagement in foreign language, physics, philosophy, and biology classes, experiential opportunities in sociology and foreign language, and improving writing across disciplines. The section closes with an active learning exercise in introductory psychology. The chapters are intended for practicing academics to easily adopt the full activity or parts of the activity into their existing course or replicate the study at their campus and in their courses.

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13 Synthesizing art, language, and history

Creating empathetic leaders of character in the foreign language classroom

Diane Richardson and Xenia Srebrianski Harwell

Introduction

Empathy, the ability to identify with and share in the experience and feelings of another, is a fundamental feature of emotional intelligence and maturity. Michele Borba refers to empathy as the "core of civilized society"[1] and believes that the ability to share emotions with others is a key ingredient in successful leadership.[2] To empower learners to express empathy through creative writing tasks, we incorporated the *David Labkovski Project*[3] into our language classes. By viewing and reflecting on David Labkovski's artwork and experiences, learners began to explore the historical period that gave rise to these works from an individual artist's point of view. In this teaching note, we discuss the pedagogical framework of our project; provide details on how we used the *Labkovski Project* to synthesize language, art, and history; and share results and student examples. The beauty of this project is that it can be adapted to many different types of courses and levels. We implemented it in two German courses – the second semester of the beginning German language sequence (LG204) and the fourth-semester intermediate German course (LG372). LG204 is a multi-section course with 11 sections of maximum 18 cadets, taught by five instructors (four military and one civilian, who was the course director and is first author) during spring 2018. Most cadets in the course were nonmajors. LG372 generally consists of two or three sections of no more than 18 cadets each. The course director and instructor of both sections during Spring 2018 is second author and the sections consisted of both majors and nonmajors, with some having placed directly into the second-year course.[4]

1 Borba, 22. See Borba, Michele. "Nine Competencies for Teaching Empathy." *Educational Leadership.* 76 no 2 (2018): 22–28. www.ascd.org/publications/educational-leadership/oct18/vol76/num02/Nine-Competencies-for-Teaching-Empathy.aspx

2 Ibid, 23.

3 The Labkovski Project. www.davidlabkovskiproject.org. This project will be discussed in greater detail further in the text.

4 All cadets at the US federal service academy where we implemented the project are required to complete two semesters of a foreign language, which most cadets complete during their second year at the academy. If cadets wish to take courses in a language that they have previous experience with or exposure to, then they must test into at least the second-year level. Otherwise, they must select a new language to learn to satisfy the core requirement.

Pedagogical framework

Our pedagogical framework draws from the World-Readiness Standards for Language Learning, published by the American Council on the Teaching of Foreign Languages, in particular the five "C's" (Communication, Cultures, Connections, Comparisons, and Communities), which highlight the importance of learning and applying a language beyond the instructional setting.[5] We also refer to research on second language acquisition that has long emphasized that language learners should not be "using language simply to practice vocabulary and structures but to explore a different world and to relate that world to their own thinking and experience."[6] One way of bringing learners to explore other worlds, to communicate about, compare, and make connections between cultures and communities, is through art and art-related projects. Through authentic artwork, learners experience historical and linguistic contexts that inspire their own authentic language use and cultural learning. Projects like ours contribute to continued efforts by language educators in the United States for curricular reform that "situate[s] language study in cultural, historical, geographic, and cross-cultural frames within the context of humanistic learning."[7]

This kind of approach requires language learners to develop "the ability to comprehend and analyze the cultural narratives that appear in every kind of expressive,"[8] including those found in artwork. Our intent is to alleviate any hesitance that some learners, instructors, or administrators may have regarding art in the language classroom by contributing to the existing body of research and projects that promote art for various educational purposes.[9] In fact, when we turn to art "with the goal of developing a moral society,"[10] we are not doing something revolutionary. We are actually taking our place within a "paradigm . . . steeped in the history of aesthetics from the eighteenth century."[11] Art-based projects expose learners to the cultural and historical aspects of a language, as well as to the emotional aspects.[12] Through art, learners can experience and express emotions while taking on multiple other perspectives: that of the artist, of the subjects in the artwork, and of others living in those worlds, times, or conditions. The ability to understand an event from multiple perspectives is a critical step in fostering the development of empathy. Images have the unique quality of enhancing "moral imagination"[13] in an enduring way that remains with and influences individuals as they develop into

5 American Council on the Teaching of Foreign Languages. *World-Readiness Standards for Learning Languages*. n.d. Retrieved 16 March 2019, from www.actfl.org/publications/all/world-readiness-standards-learning-languages/.

6 Kern, 15. See Kern, Richard. *Literacy and Language Teaching*. Oxford: Oxford University Press, 2000.

7 MLA Ad Hoc Committee on Foreign Languages. *Foreign Languages and Higher Education: New Structures for a Changed World*. 2007. Retrieved 16 March 2019, from www.mla.org/Resources/Research/Surveys-Reports-and-Other-Documents/Teaching-Enrollments-and-Programs/Foreign-Languages-and-Higher-Education-New-Structures-for-a-Changed-World/.

8 Ibid.

9 See, for instance: "Cultures and Literacies through Art for the 21st Century," www.calta21.org/calta21-curriculum/#.XFuIj1VKjIU and "art/write," https://artmuseum.arizona.edu/artwrite, both accessed 17 March 2019.

10 Riddett-Moore, 7. See Riddett-Moore, Karina. "Encouraging Empathy through Aesthetic Engagement: An Art Lesson in Living Compositions." *International Journal of Education and the Arts*. 2 no 2 (2009): 1–22.

11 Ibid.

12 For more on why emotion and affect matter at all levels of language learning, see: Douglas Fir Group. "A Transdisciplinary Framework for SLA in a Multilingual World." *The Modern Language Journal*. 100 S1 (2016): 19–47. https://doi.org/10.1111/modl.12301/.

13 Borba, 25.

empathetic leaders of character, who will subsequently be intent upon spreading these values to those within their own sphere of influence.

Developing empathetic leaders of character is a critical component of education, particularly for learners such as ours, who are soon to embark on careers as military leaders propounding Army values.[14] Character is one of the main values in the leader development program at the US federal service academy, where the project highlighted in this teaching note was implemented. The academy identifies five main facets of the character development program: moral, civic, social, performance, and leadership. The civic facet aspires to develop a student body that "demonstrates the empathy, loyalty, respect, and humility that enable an individual to treat others with dignity and to display selflessness."[15] We propose a unique contribution to the overall academy and departmental mission of developing leaders of character by integrating art-based projects across the curriculum with a focus on language and empathy.

Project details

The roots of our project

The foundation for our project was laid during spring 2017, when this chapter's first author invited cadets enrolled in LG204 to attend the *Forbidden Art*[16] lecture and exhibit at the academy's library, which was sponsored by the Center for Holocaust and Genocide Studies.[17] For an extracurricular task, cadets had the opportunity to subsequently write a reflection in German on the following questions:

- What was the most interesting information that you learned or artwork that you saw, and why?
- How did the lecture or exhibit make you feel?
- Why is this topic (Holocaust and Forbidden Art) still relevant today?

In their reflections, cadets practiced dependent clauses, superlatives, and phrases for expressing emotion. To expand on these and other art-related topics, they gave final oral presentations based on the artwork used at the beginning of each chapter in the course textbook.[18] These "Art and Artists" segments of the book allowed for some pre-project exposure to Holocaust-related themes throughout the course, since students learned about some artists whose work was deemed *Entartete Kunst* (Degenerate Art) under Hitler's fascist regime.

The next year, we wanted to continue building on the foundations of art-based projects throughout the language curriculum, and with more faculty involvement. Thus, when

14 For an in-depth discussion of Army values, see Chapter 1 of this volume.

15 Ibid.

16 Auschwitz-Birkenau State Museum. *The Exhibition 'Forbidden Art' at the U.S. Military Academy in West Point*. 2017. Retrieved 17 March 2019, from http://auschwitz.org/en/museum/news/the-exhibition-forbidden-art-at-the-u-s-military-academy-in-west-point1241.html/.

17 For further information on West Point's Center for Holocaust and Genocide Studies, see www.westpoint.edu/centers-and-research/center-for-holocaust-and-genocide-studies/.

18 Tschirner, Erwin, Nikolai, Brigitte, and Terrell, Tracy. *Kontakte: A Communicative Approach, 8th Edition*. New York: McGraw-Hill Education, 2017.

the Center for Holocaust and Genocide Studies brought the *Labkovski Project* to the Academy's library during spring 2018, we integrated the art exhibit into both LG204 and LG372 and invited one of the rotating military German instructors to join us for a docent training by the curators. That semester, cadets in LG372 discussed a wide variety of cultural and historical topics, including the role of art during the Nazi period (1933–1945); the fate of prominent exiled artists, writers, and cultural figures; civil society and notions of courage and speaking out within the context of a literary reading about a condemned Roma[19] child. Thus, the themes of the *Labkovski Project* fell naturally into the thematic context of the course. In returning to the ideas introduced in LG204, students in LG372 were able to build upon the knowledge of art and the Nazi period gained in their first year of language study and apply it to their projects in the second year.

The David Labkovski Project

The *Labkovski Project* brings the works of David Labkovski to schools across the country to educate students about the Holocaust, totalitarianism, and bearing witness to history. It emphasizes the human responses of tolerance and the strength to survive. David Labkovski, a Jewish-Lithuanian artist, was raised in the Jewish community in Vilnius, Lithuania. In the early 1930s, he migrated to the Soviet Union, where he worked as a set designer for a Yiddish theater and later studied art in Leningrad. He was drafted into the Red Army and subsequently arrested for anti-government activity. Sent to a Siberian prison camp, he survived by using his skills as an artist to earn additional food rations. Upon completion of his sentence, Labkovski returned to Vilnius in 1946 and discovered the loss of the Jewish community there. In 1958 he and his wife moved to Israel, where he continued to work, but where the public, not interested in reviewing the past, did not give him full recognition for his art until 1988, when a museum devoted to his work was established there. Labkovski died in 1991. Labkovski's art reflects his unique experience of being a witness to the totalitarianism of both the Nazi and Soviet regimes. Images of the artwork can be viewed on the project's website.

Project assignments

Cadets enrolled in LG204 during spring 2018 were invited but not required to visit the *Labkovski Project* exhibit, read the information that accompanied the paintings, make notes, and choose one specific painting about which to write a description and poetry response (see Appendix A for task instructions). There was no formal evaluation of the LG204 submissions since it was an extracurricular task. LG372 required cadets to write four essays during the semester. The *Labkovski Project* became the fourth essay, which was a mandatory graded event. Students were asked to view the exhibit, read all accompanying information, choose one painting that resonated with them, and then complete the writing assignment. This had two components: a description of the painting in German and a response to the image in the form of a poem. The poetry patterns suggested to cadets were those used in the first-year course. The grade for the description of the artwork was based on task completion, sentence structure, language, vocabulary, and comprehensibility and complexity. The poetic response was graded only for completion in

19 The Roma are a subgroup of the Romani people, known for their itinerant lifestyle.

consideration of the fact that these poems were creative works stemming from emotion and in which poetic license could be taken into consideration.

Results and examples

Although the task was not a required part of the curriculum for LG204, at least 19 cadets still found time to complete the task. Of those, one wrote a description of a painting but an unrelated poem about learning German; one only wrote a poem but no reflection; three chose a painting of fruit, which offered a more concrete option for those with lower-level linguistic skills; and 14 wrote poems and reflections that indicate a high level of ability to express emotions and empathy in English and German. We tallied all emotions and emotion-related phrases in the poems and then used a free online word cloud generator to create Figure 13.1. The size of the terms in the word cloud represents their

Figure 13.1 Emotions expressed by LG204 cadets in their poems.

frequency in the poems. The word cloud visualizes the potential of art for experiencing and expressing a wide variety of emotions, which can lead to perspective taking and the cultivation of empathy.

Overall, the work produced by cadets in both courses was very impressive from the standpoint of both language and empathy. The possibility of using both German and English seemed to potentiate the ability of cadets to create a poem that reflected their deeply felt emotions in relationship to the painting they chose. Examples of poems written by cadets in LG372 and selected for their content and emotive quality can be found in Appendix B. Poem 1 contains a powerful image of seeing and not seeing, of being seen and of fading into nonexistence. Poem 2 offers strong contrasting images of Jewish city life in Vilnius before and after the Holocaust, with haunting associated imagery of song. Poem 3 suggests an encounter with the liminal space between life and death in the Siberian Gulag, which few survive. Its author creates an image in which imprisoned bodies form a continuum in which corpses of those who have died during the night merge with the writer's own deathlike, but still live, body.

Summary

Integrating the *David Labkovski Project* across various levels of the German curriculum resulted in a unique convergence of factors: civilian and military instructors received training from the docents and cadets gained a glimpse into one artist's experience of the Holocaust and increased their historical knowledge of that period, the USSR, and the Soviet Gulag. Furthermore, cadets had the opportunity to be creative and use the language at their own level to express emotion on descriptive, reflective, and poetic levels. By displaying selected poems at the academy library, cadets were able to see the products of their language learning experience applied beyond the instructional setting. Learners in future and adapted iterations of this project might benefit more if the task is an integrated unit in the course that would allow for more specific and guided exploration of art and the Holocaust. More discussion and reflection would also be beneficial, including a pre-survey or writing task to gauge the learners' prior exposure to learning about the Holocaust. There is considerable flexibility in the application of this project, and variations can be used at different levels of language learning, or in other subjects, such as history or English. It is also adaptable to other forms of artistic expression, such as music. In this teaching note, we have emphasized the value of art, art exhibits, and art-related projects as an optimal means for synthesizing language, art, and history. Moreover, we demonstrated that it is possible to bring lofty notions of empathy, character development, and Army values into the realm of lower-division language courses and to use art as the medium through which these goals are successfully achieved. By engaging with art, our learners take their place in a long tradition of using art to access other worlds and perspectives, creating a more empathetic long gray line of leaders.

Appendixes

Appendix A

Task instructions LG204[20]

1 Write a brief description of the painting in German referring to the language and structures used in the course textbook at the beginning of each chapter in the "*Kunst & Künstler*" (Art and Artists) section and in the sections with vocabulary for describing emotions and emotional reactions.
2 Write a poem in response to the painting – you can follow one of the following formats, one of the examples from the textbook, or be creative:

- **Code-switching**: Feel free to go back and forth between languages, depending on which one best expresses what you are trying to say. Select key words and phrases to use in German while maintaining a structure in English. You can pick a key German phrase or word and keep repeating it, weaving it into your poem.
- ***Diamant***: This poem uses a traditional "diamond" format, beginning with a one-word line at the top, with each subsequent line getting progressively longer. The longest line is in the middle. After that, the poem repeats itself in reverse order, this time in German.
- ***Zwei Stimmen***: This model consists of two parallel lines in each stanza, one in German and one in English. The idea is that it is written in two voices, from the perspective of different people. The lines should be similar, but not exactly the same, and can show contrasting perspectives.

20 Part two adapted from Berg, Danielle. "Crossing Boundaries Through Bilingual, Spoken-Word Poetry." n. d. Retrieved 26 April 2019, from www.readwritethink.org/classroom-resources/lesson-plans/crossing-boundaries-through-bilingual-30525.html?tab=4#session4.

Appendix B

Example poems from LG372

Poem 1, by Cadet Will Anderson,[21] Class of 2020: Based on an untitled painting that the cadet named "Marschieren zum Lukiškės-Gefängnis" or "Marching to the Lukiškės Prison"

Sieh die Juden

See
The Jews
Wearing their Stars
Marching to their Doom
See the Woman with the Kids
Her colorful Clothes shine brightly with Hope
See the tired People walking along in the Grey
Their Desire for Survival grows smaller from Day to Day
See the Jews, see them well, because You will never see them again
Sieh die Juden, sieh sie gut, weil du sie niemals wieder sehen wirst
Ihr Wunsch nach Überleben wächst kleiner von Tag zu Tag
Sieh die müden Leute, die im Grau entlang gehen
Ihre bunte Kleidung glänzt hell mit Hoffnung
Sieh die Frau mit ihren Kindern
Marschieren zu ihrem Untergang
Die ihre Sterne tragen
Die Juden
Sieh

Poem 2, by Cadet Kevin Seaward, Class of 2020: Based on two contrasting paintings of a Jewish neighborhood in Vilnius, one depicting bustling Jewish life there before the Nazi occupation, and the other – the same neighborhood after the war, empty of people and physically destroyed.

21 All three poems in Appendix B are being published with the permission of the authors.

Wilna,
Veränderung
The streets are loud and full of life
Hier ist ein Grab für vergessene Erinnerungen
Children play in the streets
Ratten kriechen und schleichen um den Boden
Life, Laughter, Happiness
Tod, Bedauern und Liebe vermisst
Vilna is alive with songs of love
Die Wilna singt das Lied der Trauer.

Poem 3, by Cadet Joseph Heindrichs, Class of 2021: Based on a painting depicting the dance with death in the Siberian Gulag.

Der Tanz

Ein hartes Bett. Eine Leiche oben und unten.
A home. A haven from the work and the guards.
Das Bett ist steifer als meine Leiche. Alte Knochen.
I sink into my bed. Another day alive, another day of freedom.
Immer kalt. Ich bin nie so Kalt gewesen. Meine Knochen klappern.
The hurt means life, feeling. I embrace my screaming nerves.
Der Tod schlägt, ich fühle Nichts. Die Ruhe ist endlich hier.
No. Not yet. My time has not come.
Der Schmerz ist beendet. Mutter und Vater, ich komme auch.
A fire rages inside. Flames lick the inside of my brain.
Sonnenaufgang
Sunrise
Eine kalte tote Leiche
Shivering. An eye slowly opens.
Fortbestand für nur einen.

14 Simulating combat modeling in engineering

My roommate was jealous

Vikram Mittal, Gene J. Lesinski, and Matthew F. Dabkowski

Introduction

Undergraduate engineering programs include a significant amount of coursework to cover the underlying math and science principles, foundations for the engineering discipline, methodologies, tools, and design processes. Seymour and Hewitt describe this experience as "drinking from a fire-hose."[1] By the end of their undergraduate careers, many students are in survival mode, focusing on near-term objectives rather than actively learning the material.

During their final years of undergraduate college, engineering students are introduced to modeling and simulation (M&S). The role of M&S in modern engineering design and analysis has skyrocketed with advances in computing technology, coupled with the rise of model-based systems engineering. Therefore, these courses have evolved from being courses that teach a useful tool to being critical courses for students to succeed in the engineering field. As engineering educators, we must find ways to teach M&S that keeps students engaged and encourages active learning, even while they are drowning in academic material.

This need is amplified at the United States Military Academy (USMA), where students must complete rigorous military training in addition to an accredited academic program. By their final year at the academy, students enrolled in engineering programs are typically burned out and simply want to graduate. We found ourselves teaching these students in Combat Modeling (SE485), a senior-level systems engineering elective course, during the falls of 2018 and 2019. During these semesters, we implemented a new strategy for teaching the course material through having the students solve relevant real-world Army challenges.

Assessment of current techniques

Though M&S has become increasingly important in engineering curricula, very little literature is available on teaching M&S. As such, a survey was conducted on a number of different M&S courses taught nationwide, including those at our institution.[2] The survey found that most courses are structured around teaching a simulation software package.

1 Seymour, Elaine, and Nancy Hewitt. 2000. *Talking About Leaving: Why Undergraduates Leave the Sciences*. Boulder: Westview Press.

2 Mittal, Vikram, Gene Lesinski, and Matthew Dabkowski. 2019. "Avoiding Pitfalls in Undergraduate Simulation Courses." Proceedings of the Interservice/Industry Training, Simulation, and Education Conference, Orlando, 1–20.

All simulation courses initially introduce the students to M&S, including different M&S paradigms, uses, nomenclature, and appropriateness. The courses then briefly discuss the methodologies that underlie each simulation paradigm, focusing on the overall structure of the model and the underlying mathematics. The remainder of the course, which typically accounts for the bulk of the lessons, is spent teaching students the software necessary to build and run their simulations.

Most M&S courses teach the simulation software through a series of structured tutorials of increasing difficulty, as shown in Figure 14.1. These tutorials can be broken down into three stages – introductory, intermediate, and advanced. As students progress through these tutorials, there is less "hand-holding", such that the students build the skills necessary to develop the models, as opposed to just following a sequence of steps. This approach, project-based learning, has been found by many studies to be an effective approach to teach software.[3]

Most courses pull these tutorials from the set of standardized tutorials that accompany the software. These tutorials are well-established and fairly effective. However, since software developers intend for the simulation software to be used for diverse academic and industrial applications, the tutorials are often overly abstract. As a consequence, students simply learn how to feed the computer an input, "turn the knob," and get an output for a fixed set of cases. This can cause students to have a reduced respect for M&S and simply treat it as a tool for justifying a decision rather than a powerful tool for exploring a design space. Since M&S is a core competency required in all engineering disciplines, this lack of understanding directly results in programs producing graduates who are not ready for industry.

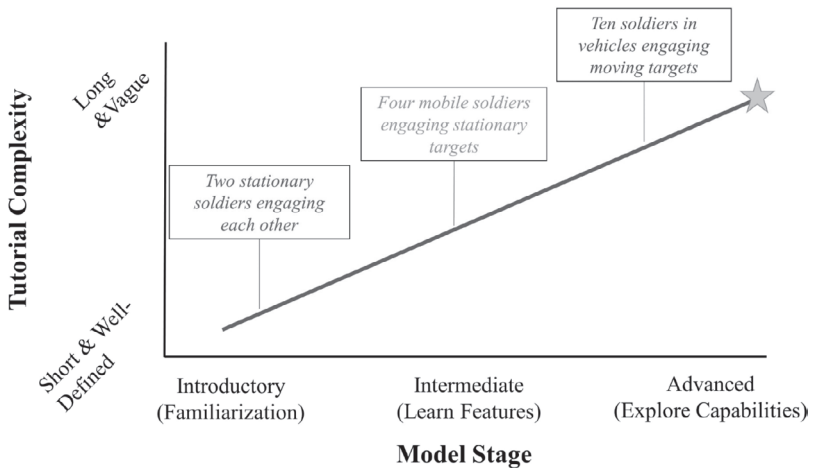

Figure 14.1 Stages of tutorial exercises used in simulation courses.

3 Cohen, Eli. 2002. *Challenges of Information Technology Education in the 21st Century*. Hershey, PA: Idea Group Publishing.

Technique implemented in combat modeling

Combat Modeling (SE485) covers a range of fundamental M&S topics to include the role of random numbers, probabilistic underpinnings of simulation, verification and validation, methods of designing and conducting simulation experiments, modeling techniques, and analysis of results. The students learn and apply algorithms specific to combat M&S, especially related to weapons marksmanship. The course is a senior-level elective that requires that students to have completed a design course and a statistical analysis course as prerequisites.

The course teaches combat modeling through the use of the Infantry Warrior Simulation (IWARS) simulation software. IWARS is an agent-based simulation program that focuses on small-unit military operations. Images of IWARS' user interface are shown in Figure 14.2. IWARS was originally chosen as the simulation software for SE485 due to its intuitive user-interface, such that after 10–15 hours of lab exercises, students became proficient using it. For a basic simulation, the students simply place blue and red agents on a map, assign missions and equipment to each agent, and allow the simulation to run.

In previous years, the course used the standard tutorials provided by the developers of IWARS to not only teach the software but also as the homework assignments and projects. Though the IWARS developers had put significant effort into the development of these tutorials, they were overly generic, somewhat contrived, and very outdated. Students would learn the basics of IWARS but did not develop a robust understanding of the role that M&S plays in the engineering design process. As such, we modified the course curriculum shifting from project-based learning to problem-based learning, where students had to model and analyze open-ended problems rather than solve closed-formed projects. We leveraged current Army challenges and assigned two projects each year that required students to address these issues. These projects were intentionally left open-ended, giving students the freedom to fully explore the design space. This freedom allowed students to better understand the strengths and limitations of M&S by forcing students to frame their own models relative to these problems.

The first project in the fall 2018 semester looked at the effects of weapon weight on the accuracy of a weapon. A common issue with soldiers is the mounting of attachments to the front of their weapons, which decreases the overall stability of the weapon. Students

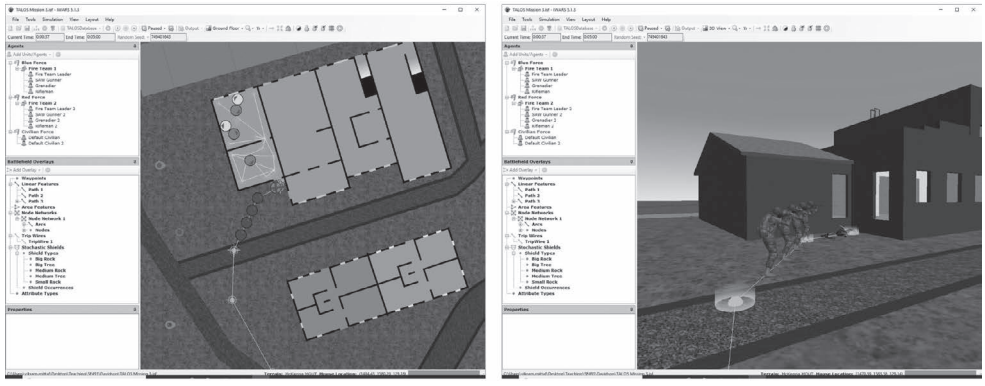

Figure 14.2 Screenshots of IWARS in the top-down view (left) and in 3D view (right).

collected data on a weapon simulator with weighted weapons and used that data to build a mathematical model that related weapon accuracy to weapon weight. That model was implemented in IWARS to show the overall change to a squad's lethality and survivability as a function of the weapon weight. The second project involved an emerging threat in the war with ISIS, who are using commercial drones to drop grenades on coalition forces. Students worked in groups to model the effects of different counter-drone technology. Each group built a mathematical model to represent the detection or exploitation of an ISIS drone. These models were then integrated together, allowing us to show the students how difficult it is to counter this challenge.

We used a similar scheme for the course projects for the fall 2019 semester, where the first project looked at weapon design and the second project looked at an emerging threat. However, the projects were refined to maintain relevancy and capitalize on lessons learned from the previous year. The first project looked at the effects of physical fitness and marksmanship on shooting in combat. Again, students collected marksmanship data on a weapon simulator, built mathematical models, and implemented these models in IWARS to identify the overall change in squad lethality and survivability. A second course project had students analyze the effects of a cyber-attack on small unit operations. Students researched different cyber exploitations and identified the consequences of being exploited. They then modeled these cyber-attacks in IWARS to understand the importance of information assurance and operational security.

Assessment of technique

We assessed the integration of relevant, ill-defined topics into the SE485 curriculum through a number of different metrics, including course-end surveys, exit interviews, and monitoring the usage of course material in senior research projects. Students were not made aware of the changes to the curriculum, hence minimizing the Hawthorne effect, by which these assessments would be biased by student excitement from trying a new approach.

USMA requires that students fill out a survey at the end of each semester to assess how well the course supported different teaching objectives. Though these surveys have questions set by the academy and academic program, instructors can also add course objectives. As such, we included the 12 course objectives on the survey taken by SE485 students. A standard *t*-test was performed to identify the significance of changes in the survey feedback. The analysis results indicate a significant increase in student's perception as to how well the class met five of the seven program objectives and six of the twelve course objectives. The results also found no significant decrease in any of the program or course objectives. Although students had to perform a similar amount of model building and output analysis as previous years, the adoption of a problem-based approach resulted in students perceiving themselves as having a better understanding of the course material. Additionally, though the curriculum change removed the reviews of statistical analysis and design of experiments, the surveys indicate that the students felt more comfortable with these topics, having applied them to real-world problems. Moreover, the surveys indicated a large increase in how well the modified course promoted lifelong learning – a major academy level learning objective.

Since anonymous course-end surveys have their inherent biases, we conducted informal interviews with students at the completion of the course. One student stated, "It was fun applying academic material to the real-world. I haven't gotten to do that in

other courses." Another student stated that they felt "developing simulations to solve Army problems was exciting." Additionally, another student commented about how his roommate felt jealous of him because he got to work on real-world problems instead of "boiler-plate, text-book problems."

Though the bulk of students echoed these sentiments, not all the comments were positive, with some students reporting that the course had a lot of "busy work" and others stating that it was "needlessly hard." Others reported issues with the software, feeling that they "spent substantial time struggling to use IWARS." These sentiments likely reflect the student frustration typically associated with a problem-based approach. Since these issues were first brought up following the fall 2018 semester, we modified the syllabus for the fall 2019 semester to include a number of project workshops during class time, where the students could get help from the instructors. This solution alleviated the issue but did not eliminate it.

Another metric for evaluating the efficacy of this approach is looking at the number of students that elected to use IWARS for their honors theses and capstone projects. These year-long projects are student-led, such that they have the freedom to choose the appropriate analysis tools. Figure 14.3 plots the percentage of projects between academic years 2016 and academic year 2019 that incorporated different simulation packages, in addition to those that specifically used IWARS. The plot shows a steady increase of the number of projects that use simulation, with a substantial increase in the number of IWARS-based projects. In particular, multiple students enrolled in SE485 saw IWARS as an opportunity to perform meaningful analysis for their honors thesis. Students looked at a range of topics including the integration of new technology into small Army units, trade-space analysis in assault weapon design, and soldier performance models. The increased usage indicates that students better appreciated M&S, and IWARS in particular, as a tool for system analysis and design.

As students graduate and commission as U.S. Army officers, we have received additional feedback from students in how they used the course material in the actual Army. One young officer reported how they pushed cybersecurity training through explaining how it impacts tactical operations, including showing the IWARS models from the class. Another officer reached out and shared the simulations that they had developed to evaluate base security.

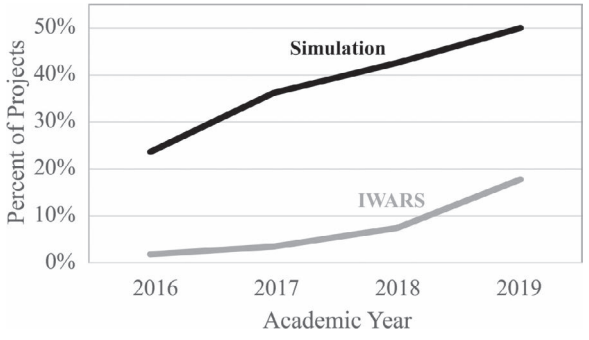

Figure 14.3 Number of capstone and honors thesis projects that used a commercial simulation package (black) and IWARS (gray) in Academic Years 2016–2019.

Lessons learned

We learned a substantial number of lessons from structuring the course around problems tied to relevant Army challenges. In particular, we developed an appreciation as to why most courses use a standard set of tutorials. Quite simply, those tutorials are quite effective at teaching the software. As such, the instructors must determine their overarching course objective before straying from the standard tutorials. If the goal of the course is to teach a software that can be used in further research applications, the instructors should remain with the standardized tutorial approach. On the other hand, if the course goal is to have students understand the art and power of simulation, the technique discussed in this paper would be more advantageous.

A second problem arises from the challenges associated with straying from the standard tutorials. Naturally, using the standard tutorials requires less development time and effort from the instructors. Additionally, developing new problems is prone to issues, since no close-form solution exists. For example, the simulations in SE485 were built on mathematical models driven by data that did not exist. We resolved this issue by having the students collect the data; however, in several cases, the results from the data were not conducive for the rest of the project. For example, upon collecting marksmanship data, the students found no correlation between physical fitness, marksmanship performance, and shooting accuracy. In these cases, notional models were given to the students to allow them to complete the project.

Third, since the projects are addressing problems without known solutions, verification and validation become increasingly difficult. Students would simply take the result from the simulation and assume that it was accurate without performing adequate verification and validation. We found that this was a weakness in the fall 2019 semester and plan to implement a designated lesson on verification and validation, including practical exercises, in the next iteration of the course.

A combat modeling course readily aligns with using Army warfighting challenges for its course projects. However, other simulation courses could benefit from this strategy as well. There is a general need for simulation courses to break away from contrived, simplistic tutorials and use simulation to tackle pertinent challenges. For example, a system dynamics class in a management program could look at the impact of recent political events on the stock market over the traditional predator-prey models. Discrete event simulation courses could model real-world processes experienced by their students, such as modeling different construction projects on the campus. Overall, the goal is to move away from textbook-based tutorials to provide more relevancy to the subject material and capture students' interest.

Summary

Though it seems straightforward and intuitive that course material should strive to achieve a high level of relevancy, most undergraduate simulation courses have become overly dependent on generic tutorials. Our class, Combat Modeling, historically relied on the standard tutorials that accompanied the simulation software. While these tutorials adequately taught the software, students did not develop a strong foundational knowledge about M&S. In the fall of 2018, we replaced the tutorials with projects based on contemporary Army challenges. This change allowed for students to address open-ended problems and develop a better understanding of modeling and simulation. Course-end surveys and exit interviews found that students felt that they had learned more of the course and program objectives than those in previous years. Additionally, significantly more students decided to use the course material to support their capstone projects and honors theses than in previous years.

15 Tapping feature films for classroom debates

Transformational or toxic leaders?

Jordon E. Swain, Everett S. P. Spain, Archie L. Bates III, and Joshua C. Bowen

Introduction

Military Leadership is a 3.0 credit hour, semester-long, core undergraduate academic course that draws from disciplines that study human behavior, including social psychology, organizational psychology, management, and sociology. A typical class is comprised of 16 cadets from various academic majors. Most cadets take Military Leadership during their junior year, after they have had formal experiences leading other cadets. However, like other undergraduate students, these cadets often lack significant leadership experience, as most of them have led only in dyadic relationships or in somewhat controlled environments. Teaching undergraduates about complex leadership theories can be difficult, as the material might be disassociated from meaningful contexts. Further, management scholars have noted a faculty-to-student communication gap and called upon management educators to engage in more varied pedagogical approaches to applying theory.[1] The use of case studies alleviates this issue by contextualizing student learning.[2] Thus, Military Leadership instructors have increasingly used movies as case studies, providing fictional or dramatized scenarios in which students can contextualize theoretical leadership concepts. A review of the use of films as a technique employed across a range of disciplines including leadership, management, and psychology provides evidence that movies serve at least four important pedagogical goals: attention getter, discussion generator, point illustrator, and theory application tool.[3] Several management teaching practitioners espouse the pedagogical use of films, with some theorists highlighting its deductive and inductive benefits.[4]

Nonetheless, the use of films in the classroom has drawbacks, including the time required to view full-length films, intellectual passivity of viewers, and copyright laws that might reduce the efficacy of using feature films. Thus, we propose two enabling strategies. The first is to use a shortened version of the movie (i.e., a vignette). The second is to apply a method that encourages conceptual reinforcement throughout the viewing activity, while

1 Stephen Payne and Barbara Holmes. "Communication challenges for management faculty involving younger 'Generation X' students in their classes." *Journal of Management Education* 22, no. 3 (1998): 364. https://doi.org/10.1177/105256299802200306

2 Brent Wilson. *Constructivist Learning Environments: Case Studies in Instructional Design*. (Englewood Cliffs: Educational Technology, 1996), 11.

3 Morten G. Ender. "Charlie don't surf," *Military Learning* (2019): 62.

4 Velma Lee and Amber Lo. "From theory to practice: Teaching management using films through deductive and inductive processes." *The International Journal of Management Education* 12, no. 1 (2014): 50. https://doi.org/10.1016/j.ijme.2013.05.001

encouraging immersive and active – rather than passive – engagement.[5] Specifically, we detail how to use a debate format in conjunction with a vignette to facilitate student learning.

Teaching practitioners propose that the use of class debates is a particularly suitable pedagogical tool for instructors of disciplines such as business and psychology, where instructors often desire to stimulate discourse and challenge students' notions.[6] Further, studies have shown the use of debates to be positively associated with increased critical thinking skills, argumentation skills, critical evaluation for decision-making during times of ambiguity, subject matter comprehension, and active learning.[7,8,9] Thus, we posit that combining a structured debate with film-watching keeps students engaged and enhances their learning experience.

While the use of in-class debate is not a new technique, a review of the extant literature provides scant evidence of the use of debate in leadership and management courses, and little to none regarding using debate with film clips. Our experience with this format suggests that an in-class debate's utility extends into the realm of teaching leadership and management, and we encourage others to experiment with its use. To highlight this technique, we detail how we facilitate deep intellectual engagement and learning through a debate based on the 1989 feature film *Lean on Me*. Specifically, we assign students to three different groups. One argues that the film's protagonist, Principal Joe Clark, is a transformational leader; a second argues that he is a toxic leader; and a third evaluates the two groups' arguments and decides upon a debate winner.

Transformational vs. toxic leadership theoretical foundation

Transformational leaders are generally viewed positively, being associated with positive outcomes in their followers and organizations. Toxic leaders fall at the other end of the desirable leadership spectrum due to their detrimental impact on their teams and subordinates. In theory, these leaders might seem markedly different. Yet in practice, one might struggle to differentiate between the two leaders.

Toxic and transformational leaders might appear similar for a few reasons. First, conditions such as crisis, change, instability, and mediocrity are ideal environments for both types of leaders to exert their influence.[10] Followers in such organizations call for resolute leaders who have the vision, ambition, power, and charisma to lead the organization in the right direction. Both transformational and toxic leaders possess these attributes. And while toxic leaders

5 Therese A. Sprinkle and Michael J. Urick. "Alternatives to the movie sandwich habit: Practical approaches to using movies to teach leadership and power." *Management Teaching Review* 1, no. 2 (2016): 106. https://doi.org/10.1177/2379298115624944

6 Sandra Kemp. "Exploring the use of learner-focused teaching approaches in different academic disciplines." *Journal of Further and Higher Education* 37, no. 6 (2013): 805, 812. https://doi.org/10.1080/0309877X.2012.684041

7 Eliza Dy-Boarman, Ginelle Bryant, Morgan Herring, and Kendra Foster. "Impact of debates on student perceptions and competency scores in the advanced pharmacy practice setting." *Currents in Pharmacy Teaching and Learning* 10, no. 1 (2018): 67. https://doi.org/10.1016/j.cptl.2017.09.011

8 Marilyn Gregory and Margaret Holloway. "The debate as a pedagogic tool in social policy for social work students." *Social Work Education* 24, no. 6 (2005): 635. https://doi.org/10.1080/02615470500182132

9 Samuel Peasah and Leisa L. Marshall. "The use of debates as an active learning tool in a college of pharmacy healthcare delivery course." *Currents in Pharmacy Teaching and Learning* 9, no. 3 (2017): 439. https://doi.org/10.1016/j.cptl.2017.01.012

10 Bernard Banks. "Transformational leadership: What leaders in values-based organizations must strive to exercise." In *West Point Leadership*, ed. Smith, Swain, Brazil, Cornwell, Britt, Bond, Eslinger, and Eljdid (New York: Rowan Technology Solutions, 2018), 14–17.

tend to use intimidation, marginalization, and selfish ambition to achieve success, they often hide these destructive behaviors (from their supervisors), disguise their self-interests as being organizationally focused, and depart the organization before their long-term negative impacts become evident. Further, susceptible followers hide leader toxicity by tolerating or participating in destructive leaders' agendas.[11,12] Thus, if the toxic leader has motivated subordinates toward achieving the toxic leader's vision, the organization will seem to be successful to outsiders, and the toxic leader might be mischaracterized as transformational. Conversely, an outside observer might mischaracterize a transformational leader's behavior as being toxic if that leader uses exacting means (e.g., assigning challenging work and holding subordinates to lofty standards) to motivate a noncompliant follower toward longer-term self-actualization. Additionally, in many instances, we find students label leaders they do not like as "toxic," even when the leader does not engage in toxic behaviors. Therefore, the distinction between toxic and transformation leaders may not be as readily apparent as one might initially believe. We contend that an in-class debate on Principal Clark's leader style facilitates student understanding of – and differentiation between – toxic and transformational leadership theories.

Class and exercise details

Overview and materials

This experiential exercise is designed for a 75-minute class. To set the stage for the exercise, students watch vignettes from *Lean on Me*.[13] After watching the film, we assign most students to two equal-sized debate teams of approximately six students and a third, smaller team of typically four students as judges. After some initial planning, the teams then engage in an instructor-facilitated structured debate addressing the question, "Is Principal Joe Clark a transformational or toxic leader?" and using the respective leadership models to support their arguments. Judges observe and score the arguments from the two teams and choose a winning team at the end of the class session. The judge's final decision is based on the two teams' abilities to make quality arguments grounded in both evidence from the film and specific components of leadership theory.

To conduct this class, teachers should obtain a copy of the film and enable their students to watch it from the beginning of the meeting between the mayor and school board superintendent (which starts approximately 4:20 into the film) to the scene where Principal Clark speaks to his staff and faculty with a microphone in the school gymnasium and exhorts them to improve by telling them, "I don't blame [the students], the failure is yours!" This sequence lasts approximately 40 minutes.[14]

11 Art Padilla, Robert Hogan, and Robert B. Kaiser. "The toxic triangle: Destructive leaders, susceptible followers, and conducive environments." *The Leadership Quarterly* 18, no. 3 (2007): 176–194.

12 Andrew Eljdid and Jeffrey Lovelace. "Toxic leadership: A guide to understanding and counteracting destructive leaders." In *West Point Leadership*, ed. Smith, Daniel, et al., (New York: Rowan Technology Solutions, 2018), 15–12 & 13.

13 Military Leadership instructors vary in their choice of assigning the viewing of *Lean on Me* vignettes as part of students' class preparation or showing the vignettes in class. The former allows more time for in-class debate and discussion. However, students who view the vignettes days prior to the in-class debate often experience less recall and develop less content-rich support for their arguments than their peers who view the vignettes in class. Additionally, group viewing of the vignettes in class allows students to simultaneously share thoughts and notes, facilitating the active learning experience. Teachers can find the film via most common search engines and purchase or rent it through many video streaming services.

14 The authors recommend skipping the film's opening scene/credits (generally first 4:25).

Exercise objectives

The following objectives guide this learning exercise:

EXERCISE OBJECTIVES
• Summarize the attributes and behaviors commonly observed in transformational and toxic leaders
• Apply knowledge of the Toxic Triangle to understand and explain how toxic leaders rise to power in organizations
• Describe the conditions, behaviors, components, processes, and outcomes associated with transformational leadership
• Describe the outcomes often associated with transformational and toxic leadership
• Synthesize knowledge of toxic and transformational leadership to be/become a better leader, develop better leaders, and make your organization more effective

Figure 15.1 Exercise objectives.

Preparing the class for the debate

We recommend that teachers provide students with class preparation instructions prior to the exercise. We typically email students one to two days before the class to:[15]

EXAMPLE EXERCISE PREPARATION GUIDELINES
• Confirm students have access to the assigned theoretical readings
• Inform students of the lesson plan and outline – that is, they will engage in a formal debate covering transformational and toxic leadership based on *Lean on Me*
• Designate student teams: "Team Transformational" debating Principal Clark is a transformational leader, "Team Toxic" debating that he is a toxic leader, and "Team Judge" using theory to evaluate both teams' arguments and choose a debate winner
• Provide an outline of the debate structure and rubric for grading (see Appendix A)
• Notify students that they will sit in an arrangement like the sketch (see Appendix B)

Figure 15.2 Example exercise preparation guidelines.

15 Appendixes A (debate intent), B (suggested room layout), and C (debate scoring rubric) are available via this book's companion website, at www.dropbox.com/sh/a275r5n320goecm/AABFd9tqEwosqbpLPGLHQv8ja?dl=0

Step-by-step in-class instructions

In accordance with the Thayer Method, the following instructions and timeline assume that students are familiar with the theories, so that the class can quickly move into the experiential exercise.[16]

Step 1 – Class introduction (7 min.): Ensure students are seated in their assigned team areas. We recommend having the students' team assignments displayed when students enter the classroom. Introduce the debate to the class by briefly reviewing the objectives, outlining the rules, and establishing the debate structure and timeline. Instructors should emphasize that judges will declare a winner based on teams' respective arguments, not based on opinions on whether Principal Clark was transformational or toxic. Also, since many students lack formal debate experience, we recommend that instructors encourage each team to prepare points in support of its arguments and in rebuttal of the anticipated arguments from the opposing team.

Step 2 – Play video (40 min.): Following the debate introduction, play the video for the whole class. We do not pause the video or interrupt in any way while it is showing. We encourage debate teams to quietly discuss or collaborate while the video is playing.

Step 3 – Debate preparation (10 min., for 57 total minutes): Immediately after the vignettes end, instruct the teams that they have ten minutes to prepare their arguments. The instructor enforces the published timeline. During this time, we suggest that the instructor mentor the judges to ensure they are equipped to accurately assess the arguments from the two teams. Instructors may provide judges the evaluation rubric in Appendix C[17] to assist them.

Step 4 – Debate (15 min, for 72 total minutes): After ten minutes of preparation, students engage in debate according to the timeline provided in Appendix A**.** Here, the instructor must be a strict timekeeper. We recommend instructing the judges to take notes during the debate, as they have a short window to deliberate, decide on the winner, and explain their decision. Through several iterations of this in-class debate, we find that instructors need to act as debate coaches during arguments and rebuttals. We encourage instructors to routinely interject during cadet statements or rebuttals, challenging them to say more on their initial arguments or to better tie arguments to concretes component of the transformational or toxic leadership model. Due to the debate time restrictions, cadets tend to make hasty and incomplete arguments, often failing to sufficiently ground their points in theory or provide evidence via specific examples from the movie. We encourage instructors to challenge students to formulate theoretically based arguments supported by examples from the film.

Step 5 – Judges deliberate, decide, announce, and discuss winner (3 min., for 75 total minutes): Following both teams' concluding statements, afford the judges three

16 Amy Shell. "The Thayer method of instruction at the United States Military Academy: A modest history and a modern personal account." *Problems, Resources, and Issues in Mathematics Undergraduate Studies* 12, no. 1 (2002): 29. https://doi.org/10.1080/10511970208984015

17 Appendixes A (debate intent), B (suggested room layout), and C (debate scoring rubric) are available via this book's companion website.

minutes to make their final decision on the winning team and formulate the basis of their decision. Ensure judges offer a brief explanation for their decisions, assessing the strengths and weaknesses of the teams' arguments. The rubric provided in Appendix C can assist with this assessment.

Closure: who won and why?

Through numerous and varied iterations of using this teaching tool, Military Leadership instructors have had teams on both sides of the argument win debates. While cadets are often initially most interested in *who* is the victor, instructors focus on *why* the victor won; that is, which argument was the most theoretically sound. In *Lean on Me*, ideal conditions for both toxic and transformational leaders are evident. Similarly, at various points in the film, Principal Clark exhibits attributes of both types of leaders. In most cases, cadets on both sides of the debate present evidence from the movie to support these aspects of their contrasting arguments. However, most instructors (and cadet judges, with instructors' assistance) find disparities in how well cadets use their assigned theories to explain the motives behind Principal Clark's leader actions (e.g., personalized need for power, vice individualized consideration), the long-term positive or negative effect of those leader actions on organizational members (e.g., teachers, staff and students), and the long-term organizational outcomes associated with Clark's actions. Well-prepared and instructor-coached judges highlight (the absence of) these arguments in their explanations of which team presented the better argument, using the rubric (Appendix C) and the previously mentioned lesson objectives. Additionally, students and instructors who have watched *Lean on Me* in its entirety, or who are familiar with the real-life story of Principal Clark, can provide contextual support for both theoretical arguments (e.g., how the school fared after Principal Clark's departure). Finally, instructors are prudent to highlight that the debate on where Principal Clark stood on the transformational–toxic leader spectrum continues well after he stepped down from his role as principal in 1989.[18]

However, the aim here is to provide students with an experiential exercise that allows them to compare transformational and toxic theories, using Principal Clark as the leader of interest. The objective is not to deem Principal Clark as either transformational or toxic. Indeed, cadets have frequently shared with their instructors that they viewed Principal Clark as a transformational leader, even though they successfully argued that he was toxic (i.e., due to instructors' assignment of cadets to teams), and vice versa. Thus, one of the benefits of this exercise is that cadets find it challenging to argue against their personal views, yet they succeed in building theoretical arguments that oppose those personal views.

Nonetheless, some instructors might find it necessary that students walk away from this exercise with a clearer answer on the matter. In general, *Military Leadership* instructors contend that *Lean on Me* depicts Principal Clark as a transformational leader who uses unconventional tactics to exact individual and organizational change during a time of crisis. Whether others agree with this evaluation is the beauty of this exercise.

18 Olandha Miller. *A Phenomenological Case Study of a Principal Leadership: The Influence of Mr. Clark's Leadership on Students, Teachers and Administrators at Eastside High School* (PhD diss., Georgia State University, 2011), 208–218.

Summary

We consider this experiential exercise to be an exceptionally effective means to teach undergraduate students about transformational and toxic leadership theories. Addressing undergraduate students' lack of practiced leadership, this exercise enhances students' understanding of leadership by facilitating the application of leadership theories to concrete examples. We have found that the vignettes and debate format described herein are engaging methods for reinforcing the desired learning objectives for cadets and other undergraduate students of leadership for a range of topics, not just the transformational and toxic theories of leadership. We also use the debate format in the application of authentic leadership theory, to discuss whether a given leader is authentic. Further, we debate leader development theories to argue whether leaders are born or made. These debates often benefit from – but do not require – movie vignettes to adequately apply leadership theories and concepts.

We have found that the experiential debate model improves students' understanding and practical application of leadership theories. Thus, students see theories less esoterically and more helpful in explaining actual behavior. Through this improved clarity, we anticipate that students will be better prepared to appropriately apply leadership theories, as they lead individuals, teams, and organizations.

16 Bringing the Thayer Method into the 21st century

T21

Corey S. Gerving, Cathleen B. Barker, Travis R. Barker, James C. Bowen, David W. Hutchinson, and Andrew S. Wilhelm

Introduction

In the early 1800's, Sylvanus Thayer instituted his famous (or, for cadets, infamous) instructional style known as the Thayer Method, which includes several key tenets: small classes, cadet preparation prior to class, minimal lecturing, and cadet briefings and board work.[1,2] An additional critical component you may see ascribed to the Thayer Method is the necessity for clear learning and performance outcomes for the lessons and the course as a whole.[3,4,5] What Thayer created was the flipped or inverted classroom. When coupled with discipline-specific content, it has been shown to be very successful in science, technology, engineering, and mathematics (STEM)-based courses.[6,7,8,9] At the United States Military Academy, all cadets (what we call our students), regardless of their intended field of study, must take one semester of calculus-based introductory physics. The cadets take the course during their freshman or sophomore year and are divided into groups, or sections, of 16 to 18 cadets for instruction. A course director oversees the execution of the course guided by the senior faculty of the department. The majority of the department's faculty are assigned as instructors working in support of this course

1 Amy Shell, "The Thayer Method of Instruction at the United States Military Academy: A Modest History and a Modern Personal Account," *PRIMUS: Problems, Resources, and Issues in Mathematics Undergraduate Studies* XII (March 2002): 27–38.

2 David Pursell et al., "Engaging Science Students with Handheld Technology and Applications by Re-Visiting the Thayer Method of Teaching and Learning," *Georgia Journal of Science: Official Publication of the Georgia Academy of Science* 68 (December 2010): 186.

3 Pursell et al., "Engaging Science Students with Handheld Technology and Applications by Re-Visiting the Thayer Method of Teaching and Learning."

4 Peter Lenn, "Avoiding the Flipped Learning Flop at West Point (40 Years Flipping, Part 3 of 5)," *Flipped Learning* (2017). Accessed from https://flippedlearning.org/syndicated/avoiding-flipped-learning-flop-west-point-40-years-flipping-part-3-5/.

5 Jeffery L. Stiefel and Merrill Blackman, "The Thayer Method: A Novel Approach to Teaching Biochemistry," *Biochemical Education* 22, no. 1 (1994): 15–15.

6 Patricia Roehling et al., "The Benefits, Drawbacks, and Challenges of Using the Flipped Classroom in an Introduction to Psychology Course." *Teaching of Psychology* 44 (July 2017): 183–192.

7 Richard M. Felder and Rebecca Brent, "The Intellectual Development of Science and Engineering Students. Part 2: Teaching to Promote Growth," *Journal of Engineering Education* 93, no. 4 (2004): 279–291.

8 Michael J. Prince and Richard M. Felder, "Inductive Teaching and Learning Methods: Definitions, Comparisons, and Research Bases," *Journal of Engineering Education* 95, no. 2 (2006): 123–138.

9 Thomas Litzinger et al., "Engineering Education and the Development of Expertise," *Journal of Engineering Education* 100, no. 1 (2011): 123–150.

director to teach the introductory physics course. Each instructor teaches approximately three sections of cadets.

As part of a pedagogical review of our teaching resources, the department focused on updating Thayer's methods for a modern classroom, combining it with a suite of instructor resources that include pedagogically proven engagement techniques from the leaders in physics education research (PER).[10] We call it *T21 – Bringing the Thayer Method into the 21st Century*. T21 has vastly improved the learning atmosphere in the introductory physics course and has the potential to be employed in an analogous fashion for other courses and programs.

T21 consists of three objectives: enable instructors to employ active learning techniques in the classroom without sacrificing content coverage; make quality physics instruction available to cadets at all hours over multiple modes of delivery; and maximize cadet opportunity to engage in physics activities. We will explore each of these objectives in further detail, provide the reader with our initial assessment of results, and offer some implementation suggestions for the use of a system like T21 in your course or program.

T21 objectives

Objective 1: Enable instructors to employ active learning techniques in the classroom without sacrificing content coverage.

> While learner-centered methods hold the promise of improved education they do have a cost. The methods require educators to make time for the learner-centered activities and so can make it more difficult to cover all the content demanded in engineering courses. One solution to this dilemma is to deliver the course content using an inverted [flipped] classroom.[11]

As Thayer knew in the 1800s[12] and modern education research has confirmed,[13,14,15] the type of student engagement necessary to reinforce long-term understanding is very time intensive. To make time for in-class active learning, Thayer's method emphasized extensive out-of-class preparation by the cadets to free up the in-class time for instructors to actively engage each cadet on the previous night's material – the original flipped classroom. While cadets had a list of detailed learning outcomes for each lesson, instructors were free to survey cadet knowledge through a variety of techniques, which may or may not have included all the learning outcomes for the lesson.

T21 continues the use of this methodology. Each lesson has specific learning outcomes that cadets must be prepared to discuss in class. The time available in the class period is insufficient for the instructor to cover all the learning outcomes, so the instructors choose the outcomes they want to discuss with their cadets. The topics not covered in

10 David E. Meltzer and Ronald K. Thornton, "Resource Letter ALIP – 1: Active-Learning Instruction in Physics," *American Journal of Physics* 80, no. 6 (2012): 478–496.

11 Greg Mason, Teodora Rutar Shuman, and K.E. Cook, "Inverting (flipping) Classrooms – Advantages and Challenges," *ASEE Annual Conference and Exposition, Conference Proceedings* (January 2013).

12 Sylvanus Thayer, "Letter to President Monroe, October 10, 1828," in *The West Point Thayer Papers, 1808–1872*, ed. Cindy Adams (West Point, NY: Association of Graduates, 1965).

13 Mason, Rutar Shuman, and Cook, "Inverting (flipping) Classrooms – Advantages and Challenges."

14 David A. Sousa, *How the Brain Learns* (Thousand Oaks, CA: Corwin Press, 2012).

15 Terry Doyle, *The New Science of Learning: How to Learn in Harmony with Your Brain* (Sterling, VA: Stylus, 2013).

class are still required learning for the cadets. If the learning outcomes are matched with the correct out-of-class resources, the cadets can learn much of what is required on their own. For what they cannot, cadets can ask questions of their instructor either in class or through additional instruction.

Objective 2: Make quality physics instruction available to cadets at all hours over multiple modes of delivery. In Thayer's day, the primary means of out of class learning by cadets occurred by studying from books. However, reading from a textbook is only one of the learning styles identified in the VARK learning model – visual, auditory, reading/writing, and kinesthetic.[16] While the effectiveness of preferred learning styles in the VARK model is the subject of scrutiny,[17,18,19] current research shows that regardless of the effectiveness of the preferred learning style, students create stronger memories by engaging multiple senses to study the material.[20] As a result, T21 has endeavored to provide course material to engage all learning styles through a combination of out-of-class instructional videos (visual and auditory learners) and reading assignments (reading/writing learners). When combined with the in-class active learning experience that includes hands-on demonstrations (kinesthetic learners), we can engage all senses through the different learning styles.

In order to make our T21 content readily available, we identified two main reasons cadets did not properly prepare for class. First, the cadet textbook was absurdly large compared to most textbooks. As a result, cadets were unlikely to take their book anywhere. We wanted to guarantee every cadet easy access to the textbook anywhere through multiple mediums. To this end, we adopted a new textbook.[21] The new book is part of the Creative Commons, a public copyright license that enables the free distribution of an otherwise copyrighted work, which allows cadets access to all of its products for free either via hardcover (nominal cost for binding), PDF download, or online access over any network and using multiple systems (cell phone, tablet, PC, etc.). Now cadets can access the textbook anywhere there is an internet or cellular connection.

The second reason cadets could not prepare for class was due to network restrictions unique to our responsibilities as a military institution. The primary network system required cadets to be logged in to the institution's local network to allow them to access course material. This prohibited cadets from preparing for class unless they were physically in front of their laptop computer in their room or in an academic area. Cadets who were away from the academy or who did not have their laptop computer had no access to course materials. We worked around this problem by offering our course material on a Google site which was accessible anytime or any place there was network or cellular service. We posted our video products on YouTube for the same reason. Fortunately, the

16 Neil D. Fleming, "I'm Different, Not Dumb: Modes of Presentation (VARK) in the Tertiary Classroom," in *Annual Conference of the Higher Education and Research Development Society of Australasia* (1995).

17 Frank Coffield et al., *Learning Styles and Pedagogy in Post-16 Learning: A Systematic and Critical Review*, LSRC reference (London: Learning / Skills Research Centre, 2004).

18 Daniel T. Willingham, Elizabeth M. Hughes, and David G. Dobolyi, "The Scientific Status of Learning Styles Theories," *Teaching of Psychology* 42, no. 3 (2015): 266–271.

19 Polly Husmann and Valerie O'Loughlin, "Another Nail in the Coffin for Learning Styles? Disparities Among Undergraduate Anatomy Students' Study Strategies, Class Performance, and Reported VARK Learning Styles," *Anatomical Sciences Education* (March 2018).

20 Joseph B. Cuseo, Viki Sox Fecas, and Aaron Thompson, *Thriving in College and Beyond: Research-based Strategies for Academic Success and Personal Development* (Dubuque, IA: Kendall Hunt Publishing Company, 2016).

21 OpenStax College, *University Physics* (Houston, TX: University Press). Accessed from https://openstax.org/details/books/university-physics-volume-1.

academy has recently upgraded our network and changed our local policies to reflect an academic-oriented institution. Much of the course content is now available to cadets via Microsoft Teams, while our video content is still hosted on YouTube. No matter the time or place, cadets now have access to material over multiple delivery methods.

Objective 3: Maximize cadet opportunity to engage in physics activities. Once we maximized course content and empowered cadets with physics content at any time or place, we set out to design an in-class experience that relied upon the proven physics education reform of the past several decades. Think-pair-share (TPS) (or a similar technique called peer instruction), interactive lecture demonstrations, tutorials in physics, and supervised problem solving are just a few of the learner-centered in-class activities that make up the T21 suite of products. These products were packaged into modules that instructors could customize to suit their classroom voice and instructional needs, making no two physics classes across the department the same. These three T21 objectives form the introductory physics program's teaching philosophy and set our cadets up with their best chance at success.

Lesson execution

Figure 16.1 shows the generic flow for an instructor planning a T21 lesson. All of our lessons begin with clearly articulated student outcomes provided by the course director. The course director publishes the student outcomes in the course syllabus, as well as the reading assignment from the textbook, the relevant video resources, and the suggested homework problems for the students. Instructors use this as the starting point for their lesson preparation. Instructors have access to an online homework system where they can see student performance on problems that align with the course director's outcomes. Based on student performance on these problems, as well as personal preference, the instructor plans their lesson by charting a path through the in-class resources (the T21 products).

In the notional flow of Figure 16.1, the instructor sees that there are four types of products available for this lesson: tutorials, ranking tasks, TPS questions, and demonstrations. Their plan is to open with a ranking task that requires students to rank the outcomes of a physical situation from least to greatest. They will follow the ranking task with a TPS question designed to invoke student collaboration with their peers, followed by a physical demonstration of a concept from the lesson. This will be followed by another TPS question to end the lesson.

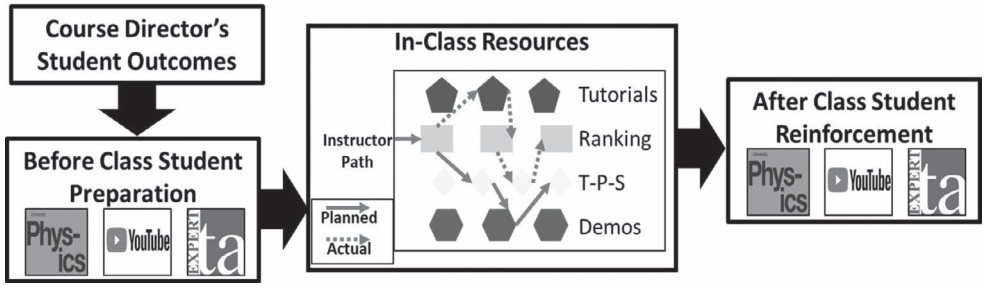

Figure 16.1 T21 lesson flow.

When the instructor starts class, however, student feedback informs the instructor that their original plan does not address the needs of the students. Fortunately, the other T21 products available to the instructor could. The instructor alters the plan, moving to a tutorial in physics, followed by a ranking task, TPS, and another ranking task. All these products were available to the instructor the whole time, to be summoned when needed. Their availability affords the instructors the agility to adapt the lesson to student needs without having to prepare all of the products themselves.

A key component to this agility is instructor familiarity with the available products and how to use them. This is accomplished through instructor education, first as part of a new faculty workshop during their first summer in the department, then reinforced through faculty development sessions for each major topical block.

Assessment of results

Instead of dwelling on the known improvements to student performance that result from the implementation of the T21 products,[22] we would like to elaborate on the improvements to the learning atmosphere in the introductory physics classrooms. Survey data indicates three main conclusions: instructors have the ability to employ active learning activities in class without sacrificing course content; students have easy access to more physics content now than they have at any time in the history of the course; and each lesson affords students more time to engage in physics than any previous iteration of the course. Coincidently, these conclusions match the three desired objectives for T21. Our results are not unique; literature supports the improved classroom experience as a result of the introduction of the active learning techniques from PER.[23]

Implementing T21 in your course

There are multiple examples of implementing a flipped classroom in STEM courses.[24,25,26,27] We list here our recommended steps, which differ in places, but not significantly. The first step toward developing a T21 model for your course is to identify the student learning outcomes you want to achieve. We used our student learning outcomes to focus the content for before, during, and after class. Student learning outcomes for your course would probably be similar, with your discipline-specific terms used instead of the physics-specific.

Once you have identified your student learning outcomes, the next step is to identify metrics for assessment and collect a baseline using your current teaching model. This will let you make quantitative comparisons between the two methods and inform future changes to your T21. The assessment data is not just exam performance. Student survey data and instructor survey data are also valuable for making comparisons.

22 McKagan, "Ten Results of Physics Education Research that Every Physics Instructor Should Know."

23 Ibid.

24 Roehling et al., "The Benefits, Drawbacks, and Challenges of Using the Flipped Class- room in an Introduction to Psychology Course."

25 Felder and Brent, "The Intellectual Development of Science and Engineering Students. Part 2: Teaching to Promote Growth."

26 Prince and Felder, "Inductive Teaching and Learning Methods: Definitions, Comparisons, and Research Bases."

27 Litzinger et al., "Engineering Education and the Development of Expertise."

Though getting your T21 to its final configuration may be time and resource intensive, getting to a basic flipped classroom model can be done with very limited resources. Sticking to the flipped classroom model first while incrementally improving the availability of resources increases the prospect of your change efforts becoming permanent. Focusing on having a complete set of final products before implementation will often result in continued delay of implementation until the project loses momentum and stalls. Once a flipped classroom model is in place, the difficult part of changing the learning environment has been done. It is easier to maintain this momentum than it is to start it.

If possible, avoid having a single person be the failure point for development. Dispersion of tasks across a larger group of instructors each semester can drastically accelerate the creation of materials.

As with any form of change, resistance is inevitable. Students are more comfortable in passive learning mode (instructor lecturing the key points of the lesson). Coincidently, instructors find traditional lecture takes less effort to prepare and deliver. Resistance from both the student and the instructor often leads to a high abandonment rate for flipped classroom teaching. However, it is important to commit to the change and stick with it through the initially planned timeline. Research shows that, by the end of the course, student attitudes in flipped classrooms are generally positive, and their performance is higher than standard learning.[28]

Summary

When we first embarked upon the journey to update the Thayer Method, we wanted to stay true to Thayer's original intent – students are responsible for learning the material outside of class, then demonstrating their proficiency through active engagement in class. In Thayer's time, the best out-of-class resources available were textbooks, and active engagement was limited to oral recitation and board work. Over the last 200 years, the out-of-class resources have virtually exploded. The availability of online resources in various formats provides students with educational opportunities Thayer could not have imagined in his day. Additionally, decades of physics education research have provided numerous in-class active engagement techniques proven to engage students at levels superior to traditional lecture. We leveraged these two developments as part of the new Thayer Method, bringing Thayer's proven technique into the 21st century.

28 Mark Dusenbury and Myrna Olson, "The Impact of Flipped Learning on Student Academic Performance and Perceptions," *Collegiate Aviation Review International* 37 (April 2019): 19–44.

17 Peer assessment and coaching

"As iron sharpens iron"

Ross M. Skilling

Introduction

The United States Military Academy (USMA) graduates the future leaders of our Army who live honorably, lead honorably, and demonstrate excellence.[1] To accomplish this complex task, the USMA utilizes four pillars of development: academic, physical, military, and character.[2] Guiding a cadet's 47-month journey through these four pillars are the company tactical officers. Tactical officers are a unique resource for cadets as they bridge the gap between the four pillars and are responsible for managing the development of each cadet. Tactical officers are the primary leader developers within the company, legal commanders for the cadets, teachers for military leader development classes, mentors for future Army leaders, and coaches to those who are not meeting the standard.

As a new tactical officer, one of my first observations was that cadets crave feedback yet do not always get honest, candid assessments of their personal leadership development from their peers. As a tactical officer of approximately 120 cadets, it is impossible for me to witness every person's behaviors, responses to events, and the multiple challenges that cadets face daily. I found myself dedicating the bulk of my time working with the top and bottom 10% of the company who innately seek or need development. The middle 80% of the company tend to be neglected and need tailored development that I alone could not provide. For this reason, I instituted yearlong peer assessments and coaching partnerships within the company. The goal of this endeavor was to increase cadet individual self-awareness, self-confidence, and humility, while building social capital among the classes.[3]

Background

Warner Burke equates the difficulty of defining leadership to that of defining love. He states, "we know it [love and leadership] when we see it and feel it, but finding accurately descriptive words for what we see and feel is not easy."[4] In leadership, as in love, it is important to select the right person. Developing cadets to excel in these leadership positions requires a focused effort to improve each individual to exhibit certain qualities.

1 Judd, Tim, Dennis Kelly, Gerald Kobylski, Jeffrey Peterson, Diane Ryan, Everett Spain, Holly West, and Meanie Wong Dodge. *Developing Leaders of Character*. West Point, NY: Academic Publication, May 2018.
2 Ibid. 9.
3 Burke, Warner W. *Organization Change: Theory and Practice*. Thousand Oaks, CA: Sage Publications, 2017.
4 Ibid. 299.

Burke proposes that these qualities are self-awareness, self-confidence, and a "dose of humility."[5] These three criteria for selection transcend organizations and are the building blocks of effective leadership. This program sought to develop these qualities through peer assessments and coaching by (1) recognizing leader development must happen at the individual level, (2) utilizing coaching as a tool for this development, and (3) leveraging peer assessments to support that development.

Leadership development

The only thing more difficult than establishing a conclusive definition of leadership is codifying a process by which leaders are developed and chosen. Any one of the 36 tactical officers at the USMA has a slightly different concept of leadership and approach to developing cadets. The definitions of leadership vary depending on an individual's personal theory regarding leadership.[6] In general, however, multiple leadership definitions can be synthesized and summarized as influencing a group to accomplish a designated outcome.[7] Making the leader developer's job more complex is the implicit leadership theory, which proposes that effective leadership is determined on an individual level. The follower's preferences and preconceived notions of how leaders should behave create a preferred leadership prototype.[8] This leadership prototype is the unique lens through which individual cadets evaluate their tactical officers. For this reason, leadership development is a complex task that requires a deliberate effort at the individual level. In an organization as large as the USMA, one-on-one coaching is not practical or possible for tactical officers to provide to an entire company. Using peer assessments, combined with coaching, is a scalable solution to help bolster development for large populations of cadets.

Peer assessments

There are multiple methods of assessing an individual's performance or characteristics. The most effective assessments come from a variety of sources, including a superior, subordinates, and peers, to create a 360-degree feedback program.[9] At the USMA, cadets are given feedback from their company tactical officers through written evaluations and verbal counseling. Their peers assess each other through a standardized survey; however, it has been my observation that these peer surveys are not highly valued and do not give the cadets the detailed feedback they crave. King and Santana from the Center for Creative Leadership state that "Peer feedback adds value because peers bring a breadth of experience and often have a sincere desire to help one another learn."[10] No one at the USMA understands an individual cadet better than his or her peers. Peers have multiple interactions with each other daily and common experiences to draw upon, which translates to better feedback on the peer assessments. To truly help each individual develop, the

5 Ibid. 386.

6 Peltier, Bruce. *The Psychology of Executive Coaching: Theory and Application*. New York, NY: Taylor & Francis, 2011.

7 Ibid. 311.

8 Kinicki, Angelo, and Robert Kreitner. *Organizational Behavior*. New York, NY: McGraw-Hill/Irwin, 2013.

9 King, Sara N., and Laura C. Santana. "Feedback-Intensive Programs." In *Handbook of Leadership Development*, 97–123, 3rd ed. San Francisco, CA: Jossey-Bass, 2010.

10 Ibid. 103.

cadets needed a better platform to give each other feedback and a systematic approach to help foster behavioral change.

Peer coaching

Frankovelgia and Riddle from the Center for Creative Leadership state that "Leadership coaching is a potentially powerful means of developing in its own right and can be particularly powerful when used to amplify other learning experiences."[11] Cadets undergo many developmental experiences throughout their time at the USMA. It is not uncommon for cadets to get discouraged or experience challenges along the way. This is by design. West Point's approach to leader development utilizes the Leader Growth Model, which includes challenge, assessment, and support.[12] Cadets are intentionally put in challenging situations that force them to confront their fears and shortcomings. Throughout this challenge, cadets are given the support they need to be successful and assessments to measure their performance. This cycle of challenge – assessment – support is the same framework used by the Center for Creative Leadership for their leadership coaching and is the basis of our company peer assessment and coaching program.[13]

Methods

Deliberate planning and preparations were necessary to conduct this yearlong initiative. The design and intent of the program was developed throughout the spring and summer of 2018. During reorganization week, cadets were challenged to conduct self-evaluations utilizing the same questionnaire that their peers would be using later in the year. This self-evaluation form was crucial in establishing a baseline for how the cadets perceived themselves and then was later used to compare feedback to gauge self-awareness. After the self-evaluation, there were four phases to the peer assessment and coaching program.

Phase one was conducted throughout the month of September 2018 as cadets engaged in Commandant's Hour training, which was facilitated by the company tactical officer. During these periods of instruction, tactical officers teach lessons that prepare cadets for their future roles as platoon leaders in the various branches of the Army. I took advantage of these periods to teach cadets about coaching and publish the initial guidance for the program as a whole.

Phase two was conducted throughout the month of October 2018 and consisted of pairing cadets up into a coaching partnership and conducting an introductory coaching session. These coaching partnerships were intended to last throughout their four years at USMA. Cadets were intentionally partnered together with a classmate from the same year group with whom they do not typically interact. The goal of this deliberate partnering was to offer a new perspective for each cadet from someone who has a different experience and background. Once the pairing was complete, the cadets completed their first introductory session with each other to build trust, establish a relationship, and start to work toward an

11 Frankovelgia, Candice C., and Douglas D. Riddle. "Leadership Coaching." In *Handbook of Leadership Development*, 125–146, 3rd ed. San Francisco, CA: Jossey-Bass, 2010.

12 Judd, Tim, Dennis Kelly, Gerald Kobylski, Jeffrey Peterson, Diane Ryan, Everett Spain, Holly West, and Meanie Wong Dodge. *Developing Leaders of Character*. West Point, NY: Academic Publication, May 2018.

13 Frankovelgia, Candice C., and Douglas D. Riddle. "Leadership Coaching." In *Handbook of Leadership Development*, 125–146, 3rd ed. San Francisco, CA: Jossey-Bass, 2010.

understanding of the other person. This phase was crucial in establishing a safe environment for the partners and set the foundation for conducting the actual peer assessments.

Phase three was conducted throughout November and December 2018 and was focused on the peer assessments. Each cadet in the company was placed in a group with six to ten cadets of the same year group who worked closely with each other. An electronic form survey was distributed to each group to evaluate peers on and consisted of four questions:

1 Describe a positive perception of this cadet during the time you have known and interacted with them (please provide context and details). To what extent does this perception define your view of this individual on a scale of 1–5 (1-low correlation, 5-high correlation)? Please state the frequency with which you observed this perception (once/infrequently/often/always).
2 Describe a negative perception of this cadet during the time you have known and interacted with them (please provide context and details). To what extent does this perception define your view of this individual on a scale of 1–5 (1-low correlation, 5-high correlation)? Please state the frequency with which you observed this perception (once/infrequently/often/always).
3 Provide what you think this cadet's single most important behavioral or character quality that will contribute to their effectiveness in their next role (their signature strength, or "super power"). Please explain.
4 Provide what you think this cadet's greatest limitation will be in their next role. This is the single most important thing for this person to change or get better at – their "one big thing" (OBT). Please list recommendations for how they can best improve their OBT.

The results of the peer assessments were sent to each individual cadet for them to review prior to the semester break. All responses were confidential. The end goal of the coaching relationships throughout the year was to encourage behavior in each cadet's strengths and learn how to change their "one big thing" (OBT) by leveraging those strengths.

Phase four began upon return of the cadets in January 2019 after semester break and consisted of coaching sessions and a review of the program. In February, specific guidance was published, and cadets were instructed to meet with their coaches to discuss the feedback. The cadets were asked to compare this data to their own self-evaluation completed at the beginning of the year, gauge their responses to the feedback, and determine what steps would be necessary to leverage their strengths to improve upon their weaknesses. The goal of these sessions was to develop a better understanding of each person's situation, generate possible solutions to improving, and create accountability for the rest of the semester. In April 2019, the cadets were asked to review the program, offer recommendations, and assess whether the program helped them develop as a better leader. The goal of this assessment was to help improve the overall effectiveness for subsequent years. Quantitative and qualitative methods were used to gauge how cadets perceived their own development and to provide feedback on the program.

Recommendations

Based on the program assessment and personal feedback that I received from cadets, I offer four recommendations to those who may try to implement a peer assessment and coaching program within their organization. First, based on assessment and feedback, I believe

that focusing on the "one big thing" increases the individual's assessment of the program, which in turn increases their commitment. Narrowing down an individual's leader developmental effort to one area focuses their attention so that change can be made effectively. The key to improving in this area is guiding the coaches to leverage the individual's "super strength" or positive qualities to augment where they are weak. People receiving feedback tend to fixate on their weaknesses and shortcomings; however, many of them were surprised and encouraged by the positive perceptions their peers shared with them.

Second, rotate coaches or utilize group coaching sessions. Feedback on the program alluded to a high interest in hearing from multiple perspectives throughout the year. Many cadets appreciated that this program forced them to interact with cadets that they otherwise would not have sought feedback from. Rotating coaches or conducting coaching within small groups compounds this effect and increase the sources of feedback for each individual.

Third, ensure confidentiality for everyone involved. The assessment and personal conversations generally expressed a large variance on the issue of confidentiality; however, to ensure responses are candid, confidentiality is paramount. Erasing confidentiality could result in a degraded climate in the organization as well as compromise the quality of the feedback.

My final recommendation is to allocate adequate time and space to conduct coaching sessions simultaneously. Using a specified time during the day takes the onus off the individuals to create coaching opportunities and allows the facilitator of the program to verify completion. Time is often the limiting factor, but by planning, allocating, and prioritizing leader development opportunities, individuals and the organization will both improve.

Conclusion

Depending on size, it is nearly impossible to develop every member of your organization at the individual level. For this reason, a peer-based feedback system is an effective solution to bolster the human and social capital. As the Psalmist stated, "As iron sharpens iron, so one person sharpens another"; peers are oftentimes a powerful mechanism for feedback and support.[14] To inspire a need for development in that middle 80%, it is important to "shock" their system and perceptions of themselves. Peer assessments help to accomplish the initial push toward self-awareness and development. People will not change unless they first understand why they need to change. Once an individual has a better overall understanding of themselves and how they are perceived, positive habits, goals, reinforcement, and focus can be inculcated through the coaching process. This process enables each coach to augment the leader development plan for that individual they are coaching. Leader development is not a "one size fits all" endeavor. Development is best accomplished at the individual level due to each person's unique concept effective leadership. A systematic peer assessment and coaching program is one technique I have found that enables an individualized approach to leader development.

14 Ps. 27:17 (NIV).

18 Experiencing social class inequality

Modified monopoly[1]

Morten G. Ender

Introduction

Simulations games have long been a feature of teaching.[2] Simple games offer the instructor opportunities to foster communication with students in both large and small classes.[3] A simulation game has successfully taught about structured inequality that required few resources, accommodated a large class, and proved well-liked by students.[4] In an extensive and exhaustive review of the literature, Dorn offers ten points in consideration of adopting a game for the classroom: (1) set goals; (2) integrate and supplement with course material; (3) time games to course material; (4) establish rules; (5) time, space, and costs; (6) pre-game preparation; (7) enthusiasm; (8) equitable familiarity with the rules; (9) structured post-game debriefing; and (10) reflection, evaluation, and assessment.[5]

I have considered each of these points and adopted the popular game Monopoly. The game has been used to teach management,[6] deviance,[7] race and ethnic relations,[8] and Pierre Bourdieu's ideas,[9] among other topics across a range of disciplines. The rules are modified to create a shared, experiential introduction to social inequality for my cadets.

I typically play my version of Monopoly in our Social Inequality (≠) course. ≠ is a junior-level required course for all sociology majors (~75%) and serves as an elective for other majors (~25%). Cadets majoring in sociology are typically more diverse than

1 Portions of this teaching note are published as Morten G. Ender, "Modified Monopoly: A Simulation Game for Teaching Social Inequality," *Academic Exchange Quarterly* 8, no. 2 (2004). Available online. Reprinted with permission.

2 Dean S. Dorn, "Simulation Games: One More Tool on the Pedagogical Shelf," *Teaching Sociology* 17, no. 1 (1989): 1.

3 Charles A. Goldsmid and Everett K. Wilson, *Passing on Sociology: The Teaching of the Discipline* (Washington, DC: American Sociological Association, 1980).

4 Julian McAllister Groves, Charles Warren, and Jerome Witschger, "Reversal of Fortune: A Simulation Game for Teaching Inequality in the Classroom," *Teaching Sociology* 24, no. 4 (1996): 365.

5 Dorn, 9–10.

6 Vijayakumar Bharathi S. and Mugdha Shailendra Kulkarni, "Competition in Monopoly: Teaching-Learning Process of Financial Statement Analysis to Information Technology Management Students," *International Journal of Information and Communication Technology Education* 16, no. 3 (2020): 22 pages, available online.

7 Maria Paino and Jeffrey Chin, "MONOPOLY and Critical Theory: Gaming in a Class on the Sociology of Deviance," *Simulation & Gaming* 42, no. 5 (2011): 571–588.

8 Warren Waren, "Using Monopoly to Introduce Concepts of Race and Ethnic Relations," *The Journal of Effective Teaching* 11, no. 1 (2011): 28–35.

9 Lauren Miller Griffith, "Bourdieu's Game of Life: Using Simulation to Facilitate Understanding of Complex Theories," *College Teaching* 60, no. 4 (2011): 147–153.

academy cadets overall, with more women and more cadets of color.[10] A class size never exceeds more than 18 cadets.

Student rules for modified family monopoly

Introduction

Monopoly is considered the leading proprietary game in the Western Hemisphere. Because it is published in 43 countries, most cadets will have familiarity with the game. The objective of the traditional game is based on one primary rule, to "become the wealthiest player through buying, renting, and selling property."

Monopoly represents a simulation of a significant feature of a capitalistic political economy and when played can help highlight the experiences of living in the Western world. However, one assumption of the rules of the game is that everyone begins equal – $1,800. I call my version of the game Modified Family Monopoly (MFM). This classroom version accounts for the socioeconomic error and distributes income according to four different classes – upper, middle, working, and lower socioeconomic – to more robustly represent class distributions in the United States. Other rules are also stratified along class lines.

Family roles

First, cadets must be "born." Cadets must draw slips of paper from a hat containing the social-class families. The drawing is random, with no replacement. Eight possible family arrangements representing the four different social classes are available. After all cadets have drawn a socio-economic class, they next get with their respective family members and adopt family roles. For example, if four cadets draw middle class family, then they must decide what type of family they will be – mother, father, and two children or two single parent mothers or four adult sisters, and so on. Ages must be identified for purposes of voting – described later. Family roles are static.

Beginning salaries

Each family begins with the following amounts of money: (1) upper socioeconomic class (05 – LTC is a lieutenant colonel, a higher ranked military officer usually with 15 to 20 years of service) receives $2,000; (2) middle socioeconomic class (W4 – warrant officer, a higher ranked specialized officer with 12 to 14 years of service) receives $1,500; (3) working socioeconomic class (E9 – sergeant major, a higher ranked enlisted soldier, with 14 to 20+ years of service) receives $1,000; and (4) lower socioeconomic class (E5 – sergeant, a lower ranked enlisted soldier with 4 to 7 years of service) receives merely $500. I use the current military pay scale and create proportional monthly salaries, where a sergeant earns roughly 42.3% of the LTC salary, a sergeant major 67.5%, and a warrant officer 74.9%.

10 For background on our students see Morten G. Ender, Ryan Kelty, and Irving Smith, "Sociology at West Point," *Armed Forces & Society* 35, no. 1 (2008): 53–54.

Taking turns

Turns are taken in descending order, beginning with the upper socioeconomic status (SES) family. Upper SES classes can move the number showing on the dice or plus or minus one. Middle SES classes can move the number showing on the dice or plus one. Working SES classes can move the number showing on the dice or minus one. Lower SES classes move the number showing on the dice.

Buying property

To simulate the policy of redlining, the lower SES can buy only the purple and the light blue properties; the working SES can buy lower SES and maroon and orange properties; the middle SES can buy lower and working SES properties, red and yellow properties, plus utilities and railroads; the upper SES can buy any properties it can afford. If an SES family lands on a property that is for sale but is ineligible or declines to purchase a property, the property is auctioned off to the highest bidding eligible SES families. Bidding runs in increments of $10.00.

Passing go salaries

Salaries are a major feature of Monopoly, and they are obtained by passing "GO." When a family passes GO, the lower SES receives $85, middle SES receives $130, upper SES receives $200, and working SES receives $100.

Taxes and jail

Any family landing on the corner "Free Parking" spot must pay a flat tax fee of $200 each time. Similarly, when landing on "GO TO JAIL," the lower SES must go directly to jail and remain there until doubles are rolled; the working SES must go directly to jail, but can pay $50 to get out on the next or any of the following turns or remain there until doubles are rolled; middle SES must go directly to jail and must roll greater than seven to be released or pay $50 on any following turn. Upon receiving instructions to "GO TO JAIL," the upper SES immediately rolls the dice. If an even number turns up, they do not have to go to jail. If an odd number turns up, they go to jail but can roll again immediately. If the second roll is greater than seven, they are released; if less, they must remain until a number greater than seven is rolled or pay $50 on any following turn.

The lottery

A $50.00 lottery ticket can be purchased prior to a family's turn. In order to double their money, they must roll a 12 on the dice on their turn (an odds ratio of 1:36). The bank invests the initial $50.00 for the lottery.

Outside of the above specified rules, all other Monopoly game rules apply. The course instructor is the bank. Finally, the contravening of a rule by any player (voted on by referendum by all players playing roles that are 18 years or older) sends a family to jail. Get out of jail rules then apply. Three violations constitute expulsion from play completely. The next section turns to academics at West Point to explain the context of playing the game.

Monopoly versus modified Monopoly

Monopoly, the Parker Brothers' Real Estate Trading Game, was developed by an unemployed American named Charles B. Darrow and trademarked by Parker Brothers.[11] The game begins and assumes equality on the social, political, and economic playing board of American life. Sociological research shows the country to be stratified along a number of dimensions including class. I have modified the rules of Monopoly to more realistically represent the forms of social inequality that exist in US society.

For 25 years I have adopted and modified Monopoly as an experiential tool in a range of courses including Social Inequality, Marriage and the Family, Introductory Sociology, and Introduction to Contemporary Social Problems. Colleagues have adopted it in Introductory Psychology at West Point. I have used it with great aplomb with our summer leadership experience (SLE) for American high school students orienting to West Point, and my wife uses it regularly and successfully with her social studies high school students.[12] The game is designed to have students experience the tasks and subtleties of being born into and living within a family of a specific social class standing and "feel" the structural conditions such situations impose on members. The affective, cognitive, character, and behavioral dimensions of social class are included in the experience as well. The modified rules can be further modified to accommodate different class sizes, courses, and time schedules. No other resources other than a traditional Monopoly board are necessary.

The goal of MFM is to introduce cadets to the problem of social inequality, create a common experience, meet academic goals, and hopefully inspire them to want to learn more about the causes and consequences of inequality. We play MFM prior to readings and lesson blocks on social inequality and stratification in the introductory course or prior to lessons and readings on families and class. While the game is played as a laboratory of sorts, it is eventually integrated and supplemented with course material. I attach the MFM rules to the course guide and encourage them to familiarize themselves with the rules prior to attending class.

Depending on the structure of our classroom, I move all the chairs to the side of the room and set up the game on the floor or use a large conference desk that is centrally located in the classroom. The key is relatively equal access to the game board – high SES should have more physical access vice the lowers. The justification here is to observe whether cadets from lower SES groups in the game move further away from the gaming activities as the game progresses. I prepare by counting all the monies out in advance and have set up the board prior to cadets arriving to class. An accelerated game requires more distribution of properties to the eligible families. As cadets enter the room, they are "born" into a family by drawing a slip of paper from a hat, randomly without replacement. They are told to adopt family roles in a household arrangement. Occasionally, cadets will merge with other families to survive the game. This should be closely monitored and included in debriefings about the social forces of economics and alternative family arrangements. Family incomes differ based on the social reality of inherited wealth. Passing "GO" amounts differ based on the relative salaries of different social classes.

11 *Monopoly*. *Monopoly: Parker Brothers' Real Estate Trading Game* (Beverly, MA: Parker Brothers, 1935).

12 Morten G. Ender, *Modified Monopoly: A Simulation Game for Experiencing Social Inequality*, Workshop held at the 68th Annual Conference of the New State Council for the Social Studies, Rye, NY (March 1–4, 2006).

Monopoly board games are inexpensive and can be purchased for approximately $30.00 new and cheaper used. More elaborate games are on the market, including an electronic version. In large classes, two or more games can be run simultaneously. Instructors can also increase the family size. I have allowed for as many as eight families to play a single game, across three 55-minute classes. The game can be played in an hour or across two or three 55-minute class periods. Again, shorter games or accelerated games may require a pre-distribution of some properties to families based on class standing. Again, I justify distributing various properties to cadets in advance as an additional form of inherited wealth (property). This justification often arises during the game but should be discussed during the debriefing session.

In preparing for the game, I have invited colleagues to visit our class to serve as bankers when running more than one game or as nonparticipant observers to assist with taking notes to use for debriefing. In preparing, instructors should treat the game as an experiment. The instructor serves as the bank but should also take mental or short-hand notes as the game progresses.

When I instruct cadets about the rules and the upcoming class, I try not to understate playing Monopoly to encourage cadets to attend, but I am enthusiastic about the game. Cadets are instructed to become familiar with the normal rules, and I also make rule copies available to all the family members of the upper SES family and a single copy available to the middle but none to the working or lower SES.

Modified Family Monopoly: the field experiment

While the game progresses, the instructor should take mental and, on occasion, short-hand notes on the cadets' interactions. Indeed, the instructor is a participant observer in this field experiment. Various forms of communication, both verbal and nonverbal, become significant social indicators to the cadets' experiences that can be addressed in the debriefing portion of the game. However, on many occasions I improvise the teaching moment and throw out concepts to cadets. For example, lower SES cadet families have complained about not being able to purchase property from other areas of the board. I point out that this is known as "redlining" – a practice of banks denying home loans to minority groups based on locations.[13]

Cadets should be debriefed about their experiences as a result of playing the game. Instructors should ask their students about their feelings and what they were thinking during the game. Of course, all thoughts, feelings, and behaviors should be placed in a larger social context and discussed. The first class after MFM involves structured debriefing, including emotional debriefing. Some examples of interactions in my classes have included higher SES family members being much more cognitively, emotionally, and physically involved in the game than lower SES family groups. Higher SES behaviors included being more verbal, more excited, closer in proximity to the board, and overall, more attentive to the activities of other players and the game in general. Indeed, on occasion, they served as sources of social control in the game. Addressing their privilege explicitly made some cadets feel uncomfortable.

13 See Kevin A. Park and Roberto G. Quercia, "Who Lends Beyond the Red Line?: The Community Reinvestment Act and the Legacy of Redlining," *Housing Policy Debate* 30, no. 1 (2020): 4.

In contrast, lower SES family players will be quieter, more withdrawn, and socially and physically distanced from the game. Others from lower SES groups might question the pedagogical legitimacy of the game, and others have indicated that they stopped coming to class (civilians, not cadets) because they were not "into the game."

Any verbalizing and other outright deviant behaviors should also be noted for later discussions. For example, some lower SES players may offer to merge with other families – creating nontraditional household configurations (e.g., polyandry) in order to solidify their economic standing. Notably, rarely did higher SES families decide to distribute their wealth among the lower SES families. However, the habitus is to be competitive, allow the norms of the game to govern behavior, and feel compassionless for people relegated to jail, poverty, and outcast.

These social forces limit and construct choices about household arrangements and choices of partners. Other deviant acts might include refusing to pay rents and stealing money from other families. Finally, one consistent feature I've noted with every course is a group or groups of families who intentionally remain in jail in order to continue playing the game. For the instructor, this facilitates an interesting discussion about limited opportunities for the poor, values, and rational choice. Most importantly, instructors should link the experiences of the game to the real social conditions that people in everyday life may face as a result of their income condition.[14]

Reflection is accomplished using the game as a shared and common experience and as a gateway to larger social issues. I rarely have a systematic method for assessing and evaluating the game. It is primarily a method of introducing a particular section in the course. Cadets have offered suggestions and strategies for improving the game. Likewise, I routinely invite other instructors into the class as nonparticipant observers. They have offered noteworthy insights about improving the game. For example, my former department chair, Casey Brower, an historian by training, suggested adding the lottery because it historically has been a resource and beacon of hope for the poor – brilliant.

Summary

The Parker Brothers' board game known internationally as Monopoly simulates the capitalist economy. However, the genesis of the game assumes economic equality with each player. I have modified the game for inequality and allow cadets to experience the euphoria of higher SES living and the disappointments of lower SES life. Instructors should consider the major points outlined by Dorn before adapting a simulation game. I have easily integrated the game into many sociology courses. Other social science, behavioral science, and humanities instructors including leadership and management instructors can easily adapt the game to their courses. Cadets find MFM to be novel and familiar. It is also inexpensive. Because it teaches from the perspective of the students and involves their active involvement, they can experience and consider inequality at different levels from oppression to privilege immediately prior to reading about it – an opportunity the professor can control and capitalize upon. Most importantly, the game is aligned with the academic goals we aspire to at West Point.

14 I recommend they read the book *Evicted: Poverty and Profit in the American City* by Matthew Desmond (New York: Broadway Books, 2017) to gain insights about how homelessness perpetuates most other social problems and the cycle of poverty in the United States.

19 Preparing students to lead productive discussions

Discuss till they drop

Stephen Finn

Introduction

In this Teaching and Learning Note, I describe two assignments that work together to increase student engagement in an introductory philosophy course. For the present purposes, I define "engagement" as active participation in class that contributes to one's own learning, as well as the learning of others. My purpose here is not to defend this definition of engagement nor the view that engagement is, in this sense defined, an important educational outcome. Instead, my goal is a simple and practical one, i.e., to share certain practices I find effective at engaging students. The students in this course, *Philosophy and Ethical Reasoning*, are mostly "yearlings" (i.e., sophomores), though a "plebe" (i.e., freshman) might sometimes be enrolled. The course is part of West Point's core curriculum, which means it is one of twenty-four required courses that span across multiple disciplines. As a required course, it is populated mostly by nonmajors who did not have a choice to take philosophy. Total enrollment for each course section is usually between fourteen and eighteen cadets. Although the assignments I present were designed for this philosophy course, they can increase student engagement in any course in which discussion plays a central role.

The course has five major course learning outcomes; at the end of the course, cadets should be able to: 1) describe relevant philosophical concepts; 2) think critically in identifying, analyzing, and evaluating claims and arguments; 3) identify moral issues and examine the implications of these issues; 4) possess a critical understanding of the moral dimensions of war and the philosophical bases of those dimensions; and 5) create written arguments that are logically rigorous and conceptually precise. The second outcome is most relevant to the concept of engagement since, as our philosophy teachers believe, philosophical argumentation is best practiced as a communal activity in which different viewpoints are presented, discussed, debated, and evaluated. The specific assignments offered here are designed to prepare students for informed and active engagement that leads to productive philosophical conversations.

Figure 19.1 Course outcomes.

This Teaching and Learning Note is divided into five sections. In the first section, I present information about PY201, the introductory course in philosophy required of all cadets at West Point. The second section describes the two assignments in detail, including a description of the assignments as well as the logistics of implementing them. In the third section, I address the time demands of creating and grading the assignments. Evidence for their effectiveness is presented in the fourth section. The final section provides a brief summary.

Description of assignments

Discussion leader assignment

To increase student engagement in class, I employ a dual approach that combines two distinct assignments. The first is the "discussion leader assignment" (DLA). Before I discuss the details of the assignment, I explain the logistics of it. Each student must complete four DLAs during the semester. Collectively, the DLAs make up approximately 10% of the course's final grade. At the semester's start, I split the students, as evenly as possible, into four groups. The groups do not work together as teams to complete the assignment; instead, the DLA is an individual assignment. The groups are used only to determine due dates, which are set after finalizing the roster. So, for example, group A members may have a DLA assignment due on the second class session, while group B members have one due on the third, and so on. After all groups have completed the first DLA assignment, the schedule repeats until everyone has completed four DLAs. Thus, sixteen class sessions (out of thirty) have DLAs due, so approximately a quarter of the students come prepared to be a "discussion leader" on any given day.

Let us now consider the details of the assignment itself. The discussion leader assignment requires the student to perform two main tasks: an out-of-class task and an in-class task. Prior to class, designated cadets must read the assigned reading carefully and write a one-page objective summary, a reflection paper of the same length, and a bulleted list of five discussion questions. On the first day of the course, I provide the students with an example DLA, written by me, that gives them an idea of what I expect. In the objective summary, the student should identify and explain the most important concepts from the reading, which is usually ten to twenty pages from the course's textbook. In the reflection, the student should reflect and elaborate upon the reading by answering such questions as: Do you agree with the claims made? Why or why not? Does the author provide strong evidence for his or her claims? What ideas are relevant to your life as a cadet, future officer, or as a member of society?

Having discussed the out-of-class portion of the DLA, I now describe the in-class portion. As previously mentioned, on any given class day, about a fourth of the students are assigned to be discussion leaders. When I am ready to begin the in-class portion of the DLA, I separate the discussion leaders and seat them in different areas of the classroom. Ideally, if your room allows, form distinct tables for discussion with one leader at each table. If the chairs and desks are fixed, you may need to improvise. Assign each of the remaining students to one of the groups. This assignment may be done randomly, by student choice, or by your choice – depending on your philosophy of arranging groups. My own preference is for random group assignment, since experience leads me to believe that some student groups can have their own personalities that become fixed over time. If low performing or less engaged students form their own group, the result can sometimes be a non-productive discussion. A random assignment each class session seems to keep

discussion fresh; furthermore, I believe it promotes a positive social value when people who do not normally converse together are forced to do so. Regardless, the discussion leader assignment can work with a variety of different grouping methods, so I encourage you to group students as you think best.

After grouping the students, the discussion leader at each table is responsible for leading a discussion for approximately twenty minutes, though you may extend or shorten this to accommodate your specific circumstances. Using their copy of the DLA, each discussion leader starts by presenting a short summary of the reading's main points to the other students in their group. To emphasize, these presentations occur simultaneously; it is not a presentation to the entire class. I suggest that discussion leaders spend two to three minutes on the first task of summarizing the material. Then, using the prepared discussion questions, each leader questions the other students and prods them into a discussion of the material. The discussion leader is responsible for ensuring that all students are actively participating, prompting the more reserved students to talk if they remain quiet for too long. The leader is also responsible for keeping the discussion on topic. To help students lead effective discussions, I provide both initial and ongoing guidance. On the first day of the course, I point out that good discussions in philosophy often involve offering evidence and reasons for your views, so that students should not only state their opinions, but support them. Philosophy is also an activity that requires clarifying concepts and defining one's terms, so a good discussion might begin by simply defining ambiguous terms. As the course progresses, the students continue to learn how to do philosophy because we explicitly cover the basics of argumentation. Furthermore, I provide a model of philosophical discussion when I lead them down the path of inquiry.

While discussion leaders are leading their groups, I do two other things to help students improve the quality of their discussions. First, I quickly scan the DLAs submitted for interesting points to highlight later in class. Such points might include insightful ideas expressed by the student in their reflections or very good discussion questions. Since the DLA written portion is only two pages, it is easy to read them quickly. After the student-led discussion is finished, I point out the insights and good questions from the DLAs. Second, during the discussion, I move among the groups and listen in, to ensure that the discussion is on track and to find more fodder for future conversations. I do not participate in the group talk and, if asked questions about the material, I prompt the students to answer on their own or to save their questions for later. After approximately twenty minutes of discussion, I spend a few minutes recapping interesting ideas or arguments I overheard. Although I do not have strong evidence for this claim, I believe immediate feedback on the performance of the groups does help them improve as the term goes on. After the DLA ends, the classroom is rearranged to its normal configuration.

The daily quiz

The DLA assignment is complemented by another assignment, i.e., the daily quiz. Since the DLA requires a good deal of preparation for the discussion leader, you can be assured that students completing the DLA are prepared to have a decent conversation. However, the other students might not be as prepared, so I provide external motivation in the form of a short, graded quiz on the assigned reading. Students must take a quiz every day there is a new reading assignment. The quiz is given before the DLA presentation begins and it usually lasts about 10 minutes. Of thirty class sessions, this usually means about eighteen quizzes. For each student, I drop their three lowest scores, to allow some flexibility and to

lessen their workload. Collectively, the quizzes are usually worth 15% of the final course grade.

The daily quiz's main purpose is to encourage students to read the material carefully enough to be prepared to contribute to the in-class discussion. An important point is that I allow students to use a page of handwritten notes, personally taken by themselves, for the quiz. For discussion leaders, I allow them to use the written portion of the DLA assignment as a substitute for handwritten notes. The choice of allowing notes is driven by four assumed educational benefits.[1] First, by taking notes, students practice how to pick out main ideas from the reading assignment. I offer tips on this, for example, by pointing out how chapter and section headings can be used as a guide. Second, taking handwritten notes likely leads to better comprehension of material, provided that students are not just writing down passages from the reading.[2] Research suggests that note taking by hand forces students to process the information for themselves, so I encourage them to summarize each paragraph or passage in their own words.[3] Third, writing notes about the reading is a form of repetition that might also help with retention.[4] Fourth, I believe that taking notes of the material encourages a form of careful and deliberate reading.

After trying a variety of different approaches to quiz design, I have settled on having quizzes with three short answer questions, i.e., questions that can be answered in one to three sentences. The quiz questions usually address the reading's main points, but I try to write questions that are specific enough to ensure that students must read carefully to perform well. However, they cannot be so specific that students making a good faith effort at the reading are unable to answer them correctly. I avoid using multiple choice questions since they both take more time to concoct and lead to more student guessing.

The primary intention behind the pairing of the DLA assignments and daily quizzes, then, is to ensure that as many students as possible are prepared to have a fruitful discussion in class. Although the dual assignment I present here may appear to be little more than a student presentation and a quiz, combining them for the particular purpose of improving student engagement is part of its novelty. Also, faculty members often use "student presentation" to refer to the activity of one or two students presenting their thoughts to the whole class and, in most cases, answering questions from other students. In the DLA assignment, on the other hand, the leaders are the ones asking the questions and learning how to direct discussion down interesting and fruitful paths. The instructor, of course, must learn how to continue to help students improve as discussion leaders. Since students are in charge of leading other students, it is also important for most of the students to be familiar with the material, hence pairing the DLA with the quiz is crucial. As I hope to support in the final section, the pairing of these two activities is effective at achieving student engagement, whereas a typical student presentation may not be as

1 I say "assumed" because I cannot defend whether these are actual benefits in my particular case. However, there is research that supports the general assumptions made, as pointed out in the following footnotes.

2 Pam Mueller and Daniel Oppenheimer, "The Pen is Mightier than the Keyboard: Advantages of Longhand Over Laptop Note Taking," *Psychological Science* 25, no. 6 (2014): 1159–1168. The authors' research suggests that taking notes longhand during a lecture has educational advantages over taking notes on a computer. Although note taking for the quiz is done outside of class, encouraging students to take notes longhand may have the educational benefits described in the article, i.e., that such notetaking promotes a deeper processing of the material.

3 Ibid.

4 See, for example, Peter Brown, Henry Roediger, and Mark McDaniel, *Make It Stick: The Science of Successful Learning* (Cambridge, MA: Belknap Press of Harvard University Press, 2014).

effective at getting all (or even most) students engaged. Before discussing the effectiveness of this teaching practice, I want to say a few words about grading these assignments.

Time demands

Time is, of course, a precious commodity; so, it is worth taking a moment to discuss how much time it takes to create these assignments. For the DLA, I include the full instructions on my syllabus.[5] The instructions can be clearly explained with a few bullet points, so not much time is needed. I spend a few minutes in the first session carefully explaining this assignment. The example DLA, if you decide to create one, may take an hour or two at the most. Once made, however, you do not need to make another one. Thus, the time spent on creating the assignment is minimal. As far as grading is concerned, the DLA assignment does not require a great deal of time. To begin with, only a fourth of the students are graded for each class session. Furthermore, I recommend using a pass/fail system, with the occasional option of giving a "pass minus." In the guidance provided to students, I point out that a highly polished piece of writing is not required, but a paper should be is easy to read, free of errors, and identifies the main ideas. Regarding the reflection and discussion questions, I look for a minimal level of effort, though I do not publicize this. I do not offer many comments, nor do I always read them very carefully. Instead, I quickly scan the DLA to ensure the student read the assignment and put some thought into the reflection. If I catch blatant errors, poor writing, or a palpable lack of effort, I may grade the DLA as a "pass minus." This grade serves as a warning to the student that more effort is required. The only time I give a failing grade to a DLA is when a student fails to submit an assignment, submits an incomplete assignment, or repeatedly submits "pass minus" work. I spend about two to three minutes grading each DLA assignment.

The daily quiz takes more time because new quizzes must be created anew each class. It usually takes me less than ten minutes to devise three short answer questions. However, since I often need to review the material to prepare for class anyway, devising quiz questions is not a heavy burden. I also use factual questions with objective answers, so it is easier to grade than grading questions that involve subjective answers. Admittedly, grading a handful of quizzes every other day might take a fair amount of time, but it is time well spent because it encourages students to read and because it reveals students' gaps in comprehension.[6] Some quizzing software on a learning management system may be used to save time, though I personally have not taken this path. Also, if you have an honor code or trust your students, you can have them grade their own quizzes in class immediately after giving it. In this case, you spend a few minutes talking through the answers after the quiz is completed. Grading and entering the result often takes less than a minute per quiz on average.

Assessment of effectiveness

Evidence for the effectiveness of this dual approach is culled from in-class surveys, course end feedback, and instructor observations. It should be noted that I conducted no

5 See the Companion Website to this volume for the instructions included in the syllabus.

6 The emphasis on encouraging cadets to read to prepare for class is consistent with the Thayer Method's emphasis on the cadet's responsibility for his or her own learning. See this volume for various definitions and discussions about the Thayer Method.

controlled experiments and the number of survey responses is small. Nevertheless, the evidence gathered collectively support the limited claim that these assignments are effective at achieving their specified goals. Whether these assignments are more or less effective than other techniques can only be definitely answered by controlled experiments, which I intend to conduct in future semesters.

To get direct feedback on DLAs and quizzes, I surveyed students in my current course and the results lend credence to the view that these assignments are effective at engaging students and preparing them for in-class discussions. Of thirteen respondents, twelve strongly agreed or agreed with the following claim: "When I am the discussion leader, the other cadets are engaged in the conversation." Nine of thirteen students report that they "often read the reading assignment carefully" when they are not the discussion leader.[7] Ten of these students also believe that the discussion leader assignments helped them learn the material, with the other three students remaining neutral on this point. In response to an open-ended question about the DLA (i.e., "Do you have any positive and/or negative comments about the discussion leader assignment?"), nine responses were positive, three responses were empty, and one was negative. According to the negative comment, "They are okay. Some people don't talk too much in general and so when the draw produces a group of quiet people it is boring." Most comments, however, expressed something akin to the following positive sentiment: "I think it is a good assignment that helps encourage reading and understanding of the material." To be sure, the sample size is small, so such evidence suggests, rather than proves, their effectiveness.[8]

As a teacher with twenty years of experience, my own observations lead me to believe that the DLA and quizzes promote student engagement as defined. Although this type of evidence is anecdotal and subjective, I have experienced a marked improvement in student classroom discussion as a result of the introduction of DLAs and daily quizzes into my course design. Although some students reveal a lack of deep understanding of the reading, it is evident that a majority of students attempt to read the material before class. I suspect a majority of my students in prior courses, i.e., those without DLAs and quizzes, did not read the assignment carefully before class. At the very least, I am certain that at least a quarter of the students are well prepared (because of the DLA assignment) and many of the rest are partially prepared (due to the quizzes) for small group discussion.

Indirect evidence for the assignments' effectiveness may be found in course end feedback surveys. Using a Likert scale with answers ranging from "Strongly Agree" to "Strongly Disagree," recent results of course end feedback shows that 100% of students in my course, as opposed to 90% in all sections of PY201, "strongly agree or agree" that "the instructor encouraged students to be responsible for their own learning." Also, 88% of my students strongly agreed or agreed with the claim that "My fellow students contributed to my learning in this course," compared to the course wide average of 70%.

7 This point is also confirmed by the results of the quizzes themselves. An average of approximately seventy percent of students score a passing grade on quizzes each day.

8 Although I do not have any records of this, I have collected similar feedback on these assignments in prior courses. Unfortunately, I did not have the foresight to save the data for use in an article such as this.

Summary

In this Teaching and Learning Note, I described two assignments that, when working in tandem, can be quite effective at encouraging student engagement in class. Furthermore, I presented evidence that, although not definitive, support the view of their effectiveness. Although the DLA, at first glance, might appear to be no different than simple group discussion, the student preparation required ensures that at least one student is ready to lead a productive conversation. The daily quiz, though not a revolutionary pedagogical concept, is an essential aspect of this approach because it helps ensure that a good number of students are prepared to discuss as well. Another benefit is that the two assignments do not require too much additional time on the part of the instructor. If you are looking for ways to encourage students to take responsibility for their own learning in class, by being prepared for and by actively engaging in discussion, then I hope you give these assignments a try. I believe that you will also find them to be effective at promoting meaningful student discussion.

20 Using virtual battlespace gaming simulations in the classroom

Searching for IEDs in class

Elizabeth L. Wetzler, Lisa M. Korenman, and Arianna D. Morell

Reflection matters

Experiential learning is a cyclical, transformative process that involves four components.[1] The learner has concrete experiences, reflects on those experiences, forms new abstractions, and then draws conclusions that can be tested in new situations. The process is continual, and each successive experience can be used to propel new abstractions, in particular when there is previous experience with course content. Advanced General Psychology for Leaders is a core course taken in cadets' first year of education; it is an advanced course specifically designed for students who have completed prior coursework in psychology, at either the high school or college level. The average section size is 15 cadets. The course is designed to capitalize on cadets' prior knowledge, making use of a wide variety of activities to illustrate military and leadership applications of relevant course material. One such activity involves the educational use of high fidelity, low-risk simulations, which are growing in popularity across disciplines. Medical educators use simulations to let students practice diagnoses and procedures without risk of harm to live patients.[2] The use of simulations in nursing serves a similar purpose, allowing nursing students to gain clinical experience during a time when fewer (and more competitive) clinical training placements in hospitals have otherwise hindered access to live patients.[3] Psychology instructors also use simulations, such as a virtual laboratory rat program that can help students learn about schedules of reinforcement in operant conditioning.[4] The use of simulations also is widespread in both civilian and military aviation training programs.[5]

The military has one of the longest histories of using simulations to facilitate learning. Tracing as far back as the use of sand tables to depict battlefields during the Roman Empire, armed forces around the world use gaming and simulations for mission training.[6]

1 D. A. Kolb, "Experiential Learning: Experience as the Source of Learning and Development," *Journal of Organizational Behavior* 8, no. 4 (1984): 21–38, doi:10.1002/job.4030080408.

2 Chinmay Shah, Vinay Kumar, and Craig Knoche, "Simulation in Medical Education," *International Journal of Basic and Applied Physiology* 1, no. 1 (2012): 167–170.

3 Magda H. Waldner and Joanne K. Olson, "Taking the Patient to the Classroom: Applying Theoretical Frameworks to Simulation in Nursing Education," *International Journal of Nursing Education Scholarship* 4 (September 17, 2007): Article18, doi:10.2202/1548-923X.1317.

4 Sandy S. Venneman and Laura Ruth Knowles, "Sniffing out Efficacy: Sniffy Lite, a Virtual Animal Lab," *Teaching of Psychology* 32, no. 1 (January 2005): 66–68, doi:10.1207/s15328023top3201_13.

5 Florian Jentsch, *Simulation in Aviation Training* (London: Routledge, 2017), doi:10.4324/9781315243092.

6 Roger Smith, "The Long History of Gaming in Military Training," *Simulation & Gaming* 41, no. 1 (February 2010): 6–19, doi:10.1177/1046878109334330.

In their most basic form, sand tables afford the opportunity to visualize and understand terrain by physically shaping it within a three-dimensional format. Advances in technology have yielded a wide variety of creative simulation options, and researchers have even explored how pairing sand tables with augmented reality features facilitates learning.[7] Perhaps more common is the use of individual and networked computer platforms and programs to include off-the-shelf games and those simulation programs designed specifically for educational use. These simulations afford low-risk opportunities to prepare personnel to encounter a variety of situations[8] and offer valuable training ranging from communication and cross-cultural competency skills[9] to preparation for urban operations. A meta-analysis of the use of computer games and interactive simulations pointed to the idea that the games and simulations resulted in significantly greater cognitive gains than those of traditional instruction.[10] More generally, meaningful gaming exercises were either associated with increased cognitive gains over traditional instruction[11] or were found to be at least as effective as traditional instruction and more enjoyable by students.[12]

Although the choice, design, and delivery of the concrete experience element might mark the logical beginning of the experiential learning cycle for educators who use simulations, thoughtful planning for the reflection component should not be overlooked. The reflection component is an essential and complex part of transformative learning.[13] Boud, Keogh, and Walker identified three steps in the reflection process: recalling details, considering the emotions felt during the experience, and relating the experience to existing knowledge. These steps help the learner form new abstractions that can be tested and applied. When paired with well-selected and -designed simulation exercises, which serve as the initial concrete experience, follow-on activities that engage learners in all three steps of the reflection process should facilitate better learning than reflection exercises that only tap into one or two of the steps. Common choices for reflection activities include group discussions and individual reflection activities. Whereas group discussions certainly afford the opportunity for recalling details of the simulation experience and relating the experience to existing knowledge, students may be less comfortable discussing the emotions they felt during the experience in a group, especially in a military environment.

7 Michael W. Boyce, Deeja Cruz, and Robert Sottilare, "Interpretative Phenomenological Analysis for Military Tactics Instruction," in *Advances in Human Factors, Business Management, Training and Education*, ed. Jussi Ilari Kantola et al., vol. 498, Advances in Intelligent Systems and Computing (Cham: Springer International Publishing, 2017), 623–34, doi:10.1007/978-3-319-42070-7_58.

8 A. L. Alexander, T. Brunyé, and J. Sidman, "From Gaming to Training: A Review of Studies on Fidelity, Immersion, Presence, and Buy-in and Their Effects on Transfer in PC-based Simulations and Games," *Training Impact Group* (2005).

9 Elaine M. Raybourn, "Adaptive Thinking and Leadership Training for Cultural Awareness and Communication Competence," *Interactive Technology and Smart Education* 2, no. 2 (May 31, 2005): 131–134, doi:10.1108/17415650580000038.

10 Jennifer J. Vogel et al., "Computer Gaming and Interactive Simulations for Learning: A Meta-Analysis," *Journal of Educational Computing Research* 34, no. 3 (April 2006): 229–243, doi:10.2190/FLHV-K4WA-WPVQ-H0YM.

11 Jessica A. Stansbury, Evangeline A. Wheeler, and Justin T. Buckingham, "Can Wii Engage College-Level Learners? Use of Commercial Off-the-Shelf Gaming in an Introductory Statistics Course," *Computers in the Schools* 31, no. 1–2 (April 3, 2014): 103–115, doi:10.1080/07380569.2014.879791.

12 Jessica A. Stansbury and David R. Earnest, "Meaningful Gamification in an Industrial/Organizational Psychology Course," *Teaching of Psychology* 44, no. 1 (January 2017): 38–45, doi:10.1177/0098628316677645.

13 Jerry Schnepp and Christian Rogers, "Evaluating the Acceptability and Usability of EASEL: A Mobile Application That Supports Guided Reflection for Experiential Learning Activities," *Journal of Information Technology Education: Innovations in Practice* 16 (2017): 195–214, doi:10.28945/3791.

Thus, individual reflection exercises, such as written reflection assignments that are often used in academic settings, may allow the learner to better reflect on the emotional component.[14] Comparing how the different reflection strategies affected student performance was the primary aim of this set of studies.

Study 1

Method

This quasi-experimental study compared performance on an exam for cadets who completed the same simulation exercise but participated in different types of reflection activities afterwards. In the fall semester of 2017, cadets completed a group discussion after the simulation but before completing the exam. The addition of an individual reflection component paired with the group discussion was introduced in the spring semester of 2018 and repeated in the fall semester of 2018.

Participants

Participants included 106 cadets across three semesters; 29 cadets in fall of 2017, 45 cadets in spring of 2018, and 32 cadets in fall of 2018.

Materials and procedure

The simulations used for the PL150 class exercise are based on Virtual Battlespace 3 (VBS3), developed by Bohemia Interactive Systems and used in training by several branches of the armed forces. The unique missions designed for this exercise are high fidelity, low-threat, and low-cost experiences that expose them to militarily-relevant scenarios where they can see the psychology concepts and theories they learn about in action. Cadets complete three missions in small teams at the simulation center. A warm-up mission affords the opportunity to become familiar with the avatar controls and for learning how to operate vehicles and weapons from their computer stations within the VBS3 system. One of the two critical missions includes a "small team search" for improvised explosive devices (IEDs) and a bomb maker while on foot in the simulated foreign terrain. A second mission occurs in vehicles, where the drivers navigate an area known for containing IEDs while their team members attempt to identify and neutralize a designated set of enemy targets. The second mission occurs under time pressure, and cadets are instructed to protect their team, accomplish the mission, and return to the start as quickly as possible. Cadets participate in one of the critical missions and play the role of observers during the other critical mission. This is designed to give them a chance to observe their classmates' behavior without the cognitive load of trying to complete the exercise themselves and allows the groups of participants to remain a manageable size. It also encourages them to view the exercise from both the participant and observer perspectives.

Upon completion of the simulation, cadets reflected on the exercise in a manner that is consistent with what they do in their military training exercises: by conducting an after

14 D. Boud, R. Keogh, and D. Walker, "Promoting Reflection in Learning: A Model," *Boundaries of Adult Learning* 1 (1996): 32–56.

action review (AAR). The AAR is designed to be a post-event discussion focusing on performance standards that allows soldiers to discover what happened during the event, why it happened, and how to sustain strengths and improve weaknesses.[15] The use of an AAR after a simulation exercise is typical, and adaptations of the AAR process have also proven useful for post-simulation reflections in nonmilitary domains as well, such as health care. Given that the current simulation exercises were designed to facilitate learning objectives directly related to psychology but presented within a military context, there existed the possibility that cadets would not focus sufficient attention on linking their simulation experiences to the course content without additional incentive to do so. Thus, we added a written reflection exercise that was completed individually by each cadet.

The inclusion of the written portion following the oral discussion is consistent with the written concept technique,[16] which has been shown to be effective for reflection in gaming and simulation tasks. The individual written reflection exercise prompted cadets to directly reflect on how the simulation experiences could be linked to the learning objectives for course lessons, which included applied problem-solving strategies and challenges, memory processes, and several theories of learning. Cadets also reflected on how overconfidence and losing mission focus undermined performance and discussed strategies for minimizing such obstacles to mission success while in the field. Instructions explicitly directed cadets to make connections to course concepts and theories by drawing on examples they experienced or witnessed during the simulation. The individual written reflection exercise specifically addressed each of the content units tested on the second exam that they complete for the class. An example of how cadets might link their experiences to related course concepts was provided for each topic. For instance, sometimes cadets watch other cadets so they can learn how to fire their weapons or make the avatar run. They have to (a) pay attention, (b) retain what they see, (c) reproduce what they saw, and (d) be motivated to do so. Often cadets struggle to reproduce the actions, asking for repeated assistance in how to make the avatar move as they desire. This example of observational learning is provided for them so they can see how to make logical connections between their own experiences and the course concepts.

Student achievement was measured as the percentage of items answered correctly from 18 multiple-choice questions. Inclusion of three semesters of data allowed the researchers to compare performance for cadets who completed only the group discussion versus the group discussion plus individual reflection, as well observe possible differences between the fall and spring semesters. Thus, any change in performance noted from fall 2017 to spring 2018 (when the individual reflection was first added) could also be compared with performance to fall of 2018 (which also included the individual reflection). This further allowed the researchers to evaluate whether the evidence suggested that changes in performance were simply related to being in the second semester of freshman year as opposed to the first semester instead of the actual reflection exercises.

15 J. A. Morris, C. M. Brotheridge, and J. C. Urbanski, "Bringing Humility to Leadership: Antecedents and Consequences of Leader Humility," *Human Relations* 58, no. 10 (2005): 1323–1350.

16 Charles F. Petranek, "Written Debriefing: The Next Vital Step in Learning with Simulations," *Simulation & Gaming* 31, no. 1 (March 2000): 108–118, doi:10.1177/104687810003100111.

Results and discussion

The average percentage scores for correct answers on the 18 multiple-choice items revealed that although cadets in fall 2017 scored well overall (M = 80.84, SD = 12.74), both the spring 2018 (M = 87.53, SD = 9.41) and fall 2018 (M = 89.24, SD = 9.35) classes performed even better. Results from a one-way analysis of variance showed that adding the individual reflection exercise to the group AAR discussion for the spring 2018 and fall 2018 classes resulted in significantly higher multiple-choice exam scores on related material, F (2, 103) = 5.57, p = .005, η = .10. Bonferroni planned comparisons showed that both the spring 2018 and fall 2018 cadets scored significantly higher than the fall 2017 cadets, though spring 2018 and fall 2018 did not differ significantly from each other.

Consistent with prior research, results from the current study support the notion that the reflection component is in essential step in transformational learning.[17] Furthermore, these results indicate that the specific type of reflection matters, with the addition of an individual reflection exercise to the group after action review leading to better performance than the group after action review alone.

In the current study, however, cadets in the classes that completed both the group reflection and the individual reflection by default engaged in a longer period of reflection than the cadets who completed only the group discussion. Thus, the driving factor in increased performance on the exams may have been related to more time on the task of studying than on the type of reflection per se. To better understand the nuances driving the observed effect in Study 1, the second study compared the different types of reflection while holding the amount of reflection time constant.

Study 2

Method

This study compared performance on an unannounced quiz for cadets who completed the same simulation exercise but different types of reflection activities (i.e., group versus individual) for exactly 15 minutes immediately following.

Participants

Participants included 38 cadets enrolled in three sections of PL150 during the fall of 2019. Random assignment determined the type of reflection for each section.

Materials and procedure

The simulations used for the PL150 class exercise in Study 2 were identical to those used in Study 1. However, upon completion of the simulation, cadets engaged in a timed reflection exercise that targeted concepts associated with operant conditioning, observational learning, and memory, as well as self-regulation and conscientiousness. All cadets

17 Schnepp and Rogers, "Evaluating the Acceptability and Usability of EASEL: A Mobile Application That Supports Guided Reflection for Experiential Learning Activities."

received a printed copy of the reflection exercise prompts for each category, and they were allowed three minutes for each category. Cadets in the group reflection shared their answers aloud, and cadets in the individual reflection recorded their answers privately.

One week later, cadets completed an unannounced 15-item quiz on the target content, with three multiple-choice questions from each category. Student achievement was measured as the percentage of items answered correctly. This afforded a direct comparison between the effects of the individual versus group reflection.

Results and discussion

A *t*-test for independent groups comparing quiz scores for cadets who completed the reflection individually versus in a group revealed a statistically significant difference in performance, $t\ (36) = -2.13$, $p = .04$, with Cohen's $d = .71$, indicating a medium-to-large effect size. The 15 cadets who engaged in individual reflection ($M = 80.89$, $SD = 10.94$) scored higher than the 23 cadets who completed the group reflection ($M = 72.75$, $SD = 11.88$). Results from this study suggest that individual reflection helped cadets perform better at a later point in time on an unannounced quiz than did group reflection.

Summary and conclusion

The results from these two studies suggest that there is value in engaging in individual reflection, even after group reflection, and that the positive effects are evident at least one week later. These findings may have important implications not only for how reflection exercises are conducted at West Point and in the Army but also for how civilian instructors decide to assign reflection after simulations in their own classes. For example, some cadets, soldiers, or students may be quieter during group discussions or may be inclined to engage in social loafing; they may miss out on a valuable part of the learning experience if the reflection is only in a group discussion format. The use of individual assignments may encourage those individuals who are less inclined to participate in group discussions to still engage in this valuable part of the learning process.

Results indicate that individual reflection is beneficial for learning. Thus, to fully maximize learning outcomes, instructors should consider the type of reflection exercises that follow simulation-based learning experiences with the same level of thoughtfulness that they use for deciding which type of simulation to employ. Those wishing to maximize the positive educational benefits of using simulation exercises, in an effort to create a transformational learning experience, may benefit from including an individual reflection component.

21 Making leaders at the group level

The cadet company

Brian J. Reed, David B. Lora, and David G. Weart

Introduction

Every summer, approximately 1,200 American men and women arrive at the hallowed grounds of West Point, New York, to begin their transition from civilian to commissioned officers in the United States Army. The arduous four year experience at the United States Military Academy (USMA) provides unmatched educational rigor complimented by a supportive developmental environment that facilitates each cadet's journey to reach their respective potential. Cadet Company Tactical Teams (TACs) are central to managing the tension between challenge and support for every cadet's experience. TACs are the primary integrators of cadet leadership development. They facilitate leader development processes at the organizational level to graduate U.S. Army officers ready to fight and win our nation's wars. TACs create developmental cultures through challenging leader and follower opportunities, making meaning of experiences, assessing leader development, and encouraging ownership. As proven mid-career soldiers in the U.S. Army, TACs utilize their experiences and education to contribute to the academy's mission of graduating leaders of character.

The primary audience for this chapter is an educator who aspires to coach, teach, and mentor groups of students. While serving in a unique role, TACs share similar responsibilities to their peer educators at civilian institutions. Most importantly, they share a similar calling of positively influencing the nation's next generation of leaders. This chapter describes how TACs utilize the academy's standardized processes for development to facilitate leadership development in transitioning adults. The processes described are reproducible in values-based organizations and educational settings.

Background

Mirroring the Army's basic organizational structure, West Point's 36 companies (approximately 130 cadets per) represent cadets from diverse educational, ethnic, and socioeconomic backgrounds. Fundamental to the academy's developmental system, the cadet companies provide each cadet a secure base from which to learn how to follow and eventually lead in a supportive experiential manner.

Seniors and juniors lead the company, while sophomores are responsible for a freshman. Cadets experience many of the same situations as their peers in civilian colleges. The class of 2022 is 24% women, 32% minorities, and represents every state and 13 foreign

militaries.[1] They gain privileges to travel and bring vehicles to campus through their four years. They study abroad, compete in Division I athletics, and tutor students at local high schools. The companies are led by two TACs who have a combined 17–30 years of Army experience as an officer and noncommissioned officer (NCO).

USMA selects TACs based on their job performance, future potential, and demonstrated capacities as a leader developer. Officers earn an MA in social-organizational psychology at Teachers College, Columbia University, before serving as a TAC. NCOs attend a three-week executive education program modeled after the full-year course and receive continuing education units upon completion. Graduates gain a greater understanding of West Point's leadership development process and their own plan for implementation with cadets.[2]

Challenges and opportunities

The academy experience provides opportunities for every cadet to test and strengthen their physical fitness, intellect, and character. Some events and courses are directed for the cadets, but many opportunities are found through their own interests in clubs, research, and in the classroom. These developmental opportunities challenge the cadets beyond their current capacities, and they are the most potent for leadership growth.[3] Constantly challenging cadets to grow, adapt, and overcome adversity is vital to preparing them for their future profession. The academy's development system prepares cadets by presenting progressively rigorous leadership challenges for cadets as they mature and assume roles of increased responsibility.

Job assignments can be particularly rich sources of challenge for cadets when they encounter novel situations, unfamiliar problems, or interpersonal conflict.[4] Challenging experiences create disequilibrium, causing people (cadets) to question the adequacy of their skills, frameworks, and approaches.[5] TACs use a combination of assessment data, feedback, and the cadet's needs to assign leadership positions in the cadet company each semester. TACs will often place cadets in specific leadership or staff positions that challenge a cadet based on their developmental needs. For example, a cadet who struggles with confidence might be assigned a management position to lead meetings and coordinate plans with their peers. By supporting cadets through a development challenge and reinforcing the desired behaviors, TACs provide the resources needed for successful learning and change.

Assessing leader development

Stephen Covey reminds us to "first seek to understand, then to be understood." Assessing a cadet's current leadership capacities and developmental needs is the critical starting

1 "Class Profiles," United States Military Academy, www.westpoint.edu/about/west-point-staff/g5/institutional-research/class-profiles.

2 West Point uses the Center for Creative Leadership's differentiation between leader and leadership development. Leader development focuses on expanding an individual's capacity to be effective in leadership roles and processes, while leadership development is the expansion of a collective's capacity to produce direction, alignment, and commitment.

3 George Forsythe and Emily Spencer, "Leadership Development: Growing Effective Leaders." In Smith et al. (Eds.), *West Point Leadership*. New York, NY: Rowan Technology Solutions, 2018.

4 Ellen Van Velsor, Cynthia McCauley, and Marian Ruderman, *The Center of Creative Leadership Handbook of Leadership Development* (Third Edition). San Francisco: John Wiley & Sons, 2010.

5 Van Velsor et al., *The Center of Creative Leadership Handbook of Leadership Development* (Third Edition).

point for a TAC in cocreating a leader development plan for each cadet. Structured assessments are important to leadership growth because people are generally not accurate self-reporters.[6] The assessment process is a continual two-way dialogue where the TAC assumes a hybrid role of counselor or coach based on each cadet's need at that given time. If this is done well, TACs stimulate their cadets to conduct deep self-assessment of their current motivations, behaviors, and values. Assessment contributes to each cadet's leader development by helping them understand their current situation in context at the academy and future role as officers. An additional outcome is an increased motivation to capitalize on the various opportunities and experiences available at the academy.

TACs consider two structures when assessing leader development: the Army leader requirements model of leadership competencies and attributes and Robert Kegan's levels of adult development.[7] Cadets in stage two of Kegan's model (instrumental mind) are impulsive and focus on their own needs.[8] Stage 3 (socialized mind) cadets focus on relationships with teammates and connections with others. Cadets in the fourth stage (self-authoring) seek to support the institution through volunteering for recruiting or leading their company. A 2005 study found 62% of cadets were in stage 3 or transitioning to stage 4 before graduation.[9] Combining the Army requirements model with an understanding of adult development allows TACs to compare across classes and structure and use a common dialect with senior leaders.

TACs use objective and subjective data points to conduct formal and informal assessments of their cadets and organizations. Cadet Developmental Reports (CDR) are formal assessments that occur through structured counseling sessions at the front and back end of semesters as part of performance reporting. Periodic Developmental Reports (PDR) are behavioral reports written by professors, TACs, and other cadets (similar to a 360 survey) that often provide the richest data points.[10] Informally, TACs provide mentorship to cadets in guiding them through various challenges at the academy. Objective data points include academic grades and physical fitness testing.

Sources for assessments vary by class. Academic and physical aptitude tests are appropriate starting metrics for freshman, but seniors might be asked to rank their strengths and weaknesses from the Army leadership competencies and attributes before starting each semester.[11] Some TACs will have cadets assign a theoretical grade and support with evidence why they deserve the grade. At a minimum, TACs will understand the cadet's level of self-awareness using these tools.

With a myriad of data sources, TACs rely on their experience and intuition to provide a subjective assessment based on what they observe and input they receive from external sources. TACs distill the information in order to facilitate meaning making for the cadet and encourage agency.

6 Philip Erdberg, "Assessing Personality: Psychology's Unique Contribution," *The California Psychologist*, 26, 2000.

7 *Field Manual 6–22: Army Leader Development*, Washington: Department of the Army 2019, 1–15.

8 Robert Kegan, *The Evolving Self: Problem and Process in Human Development* (Stages of Adult Development). Cambridge, MA: Harvard University Press, 1982.

9 Philip Lewis, George Forsythe, Patrick Sweeney, Paul Bartone, Craig Bullis, "Identity Development During the College Years: Findings from the West Point Longitudinal Study," *Journal of College Student Development*, 2005, 46(4): 357–373. doi:10.1353/csd.2005.0037.

10 Developing Leaders of Character, https://s3.amazonaws.com/usma-media/inline-images/about/cadet_consumer_information/pdfs/developing_leaders_of_character.PDF, 32.

11 *Field Manual 6–22: Army Leader Development*, 1–15.

Meaning making

Meaning making is the interpretive framework through which individuals assign purpose and significance to an event.[12] In short, it is how one makes sense of an experience. This meaning framework is derived from and linked to one's larger worldview, one's core values and beliefs, and assumptions on how the world operates; and is created through culture, experience, education, training, and personal make-up. The need for meaning includes the purpose of the operation or event (what is achieved); justification (why it is necessary); self-worth (how an individual contributes); and efficacy (how to tell if the outcome is achieved).[13] TACs apply the framework to link experiences at the academy to the operational Army and explain why an effort is necessary and why the student was chosen to accomplish the task or mission.

Academic programs also connect student assessments into academic coursework. PL300 Military Leadership, taught in the Department of Behavioral Sciences and Leadership, exposes cadets to theoretical grounding of leadership and asks them to reflect on experiences and develop a leadership philosophy. The seniors' capstone course, MX400 Officership, poses a final opportunity to synthesize their experience within the academy's system and accept their transformation into the military profession.

TACs provide transparent communication connecting the cadet's leadership experience and the larger purpose – that is, how the mission accomplishment fits into the larger organization's purpose. Discussions facilitate the second and third phases of Kolb's learning cycle to reflect and form concepts. In the Army lexicon, this is translated into providing a task and purpose. Routine feedback focused on specific events and behaviors in context is critical to facilitate leader growth.

The framework of making meaning is best applied before and after summer military training, where cadets can focus on their position and receive a report on their performance. Cadets attend troop leader training between their second or third summers to lead an Army platoon under the guidance of an Army officer for three weeks. This experience is not unique, as other colleges use internships and cooperative education to expand knowledge from the classroom to the real world. Northeastern University in Boston, MA, considers the experience the "cornerstone of the university."[14] For USMA, the Merchant Marine Academy, which sends every cadet to sea for entire semesters, and Northeastern, the key is not only with the challenge but with the discussions and framing that occur before and after the event.

Prior to training, TACs will focus discussions with cadets on the larger purpose of troop leader training and explain learning objectives for the event. They establish contact requirements with the academy and provide specific expectations for what the cadets will encounter in the unit. Some cadets will spend their time leading soldiers in the woods of Georgia for three weeks, while others might oversee maintenance on helicopters in

12 David Barnes, Kevin Banks, Michael Albanese, and Michael Steger, "Meaning Making: The Search for Meaning in Dangerous Contexts." In Patrick Sweeney, Michael Matthews and Paul Lester (Eds.), *Leadership in Dangerous Situations: A Handbook for the Armed Forces, Emergency Services, and First Responders* (Annapolis, MD: Naval Institute Press, 2011).

13 Barnes et al., "Meaning Making: The Search for Meaning in Dangerous Contexts."

14 Northeastern states the experience allows students "to transform work across academic and professional contexts" and leads to employment preparation and 93% employment after graduation. "Cooperative Education," Northeastern University, https://careers.northeastern.edu/cooperative-education/.

Alaska. Following training, TACs and cadets will meet to check in on how the cadet fit in with the team and encounter new complex leadership issues. This session is also critical to ensure the cadet experience met the Army's expectations and values.

Creating ownership

Personal readiness is a prerequisite for individual leader development.[15] Similarly, cadets must take agency of their role as a leader in contributing to developmental processes in their company. As cadets progress in positions of increased leadership authority, they experience a larger sphere of influence and obligation to lead and develop their companymates. Simone Askew, a 2018 graduate, was the highest-ranking cadet her senior year. In a 2017 interview with ESPN, she exemplified her position of authority and responsibility by explaining "my duty is to serve the corps, so I have to focus on that."[16]

Kolb's experiential learning cycle outlines that learners will have an experience, reflect, from concepts, and put concepts to work in the real world.[17] Gardner and Koth suggest that preferred learning styles applied to experimental learning connect theory and practice and improve course efficiency.[18] TACs and company leaders select leadership positions for the rest of the company to meet individual needs, encourage growth, and gain buy-in.

Sometimes an unlikely position coupled with agency can lead to a different perspective and encourage development. James was a recent senior who struggled with meeting the physical requirements at the academy and was required to attend early morning remedial fitness training. He barely participated in sports in high school and enjoyed playing video games on weeknights more than waking at 5 a.m. for rigorous training with 10–15 cadets. Cadet leaders saw his struggle with motivation, embarrassment at his poor performance, and recommended him for the position of leading fitness training each morning his final semester. He entered the position with autonomy and an opportunity for growth – knowing that his leaders in the company and TAC supported him. He flourished in the position by leading and empathizing with cadets struggling to improve. James calls the unsuspecting leadership position a turning point in his transformation as a leader.

Cadets are always at the forefront of leadership decisions and planning at the academy. Daine Van De Wall, the commander and highest ranking cadet in the class of 2020, describes his position as responsible for "setting objectives . . . and a vision for how to get there."[19] He works with the head of the TAC department, a senior Army colonel, who coaches and leads side by side with Daine. All TACs in the department follow their lead and use a developmental model to allow their partner cadet commanders to direct the company. Granting cadets authority and responsibility means coaching cadets on

15 Forsythe and Spencer, "Leadership Development: Growing Effective Leaders."

16 Katie Barnes, "Sports Shape the Success of Barrier-breaking West Point First Captain Simone Askew," *ESPN*, 2017, www.espn.com/espnw/culture/story/_/id/21362634/sports-shape-success-barrier-breaking-west-point-first-captain-simone-askew.

17 Alice Y. Kolb and David A. Kolb, *The Kolb Learning Style Inventory – Version 3.1. 2005 Technical Specifications*. Boston, MA and London: HayGroup Resources Direct, 2005.

18 Brenda Gardner and Sharon Korth, "Classroom Strategies that Facilitate Transfer of Learning to the Workplace," *Innovative Higher Education*, 1997, 22(1): 45–60. https://doi.org/10.1023/A:1025151609364.

19 Brandon O'Connor, "Cadet Daine Van de Wall takes lead of USMA Corps of Cadets," *The Army Times*, August 21, 2019, www.army.mil/article/226063/class_of_2020_cadet_daine_van_de_wall_takes_lead_of_usma_corps_of_cadets

leadership and advising them on the Army's expectations, and sometimes this means allowing them to fail.

The cadet chain of command assigns military development grades, manages internal processes, and leads support programs for the company with mentorship from the TACs.[20] Cadets are the first line of responsibility to conduct counseling with subordinates and coordinate academic and physical remedial programs. This cadet-led support structure maintains their agency of the team and development of individuals. Cadet supervisors additionally assign 35% of military development grades. This quantifiable action is a reminder of the leader's responsibility to their subordinates.

The purpose of having cadets assign grades and recommend discipline for their peers is twofold: first, they will be faced with similar conflicts after graduation; second, the experience of making a hard decision with a peer can nudge a cadet toward the next level of adult development. Cadet leaders are the first to recommend grades and punishment to the TACs and higher-level academy leadership. Their opinion is valued, and many times they set the parameters for both punishment and grades to senior leaders. They will be faced with the same dilemmas in as few as six months from graduation while leading a platoon of soldiers with decades of experience. Lastly, making the hard decision to choose the institution's guidelines for grading over friendship can be a seminal moment in progressing a cadet to Kegan's fourth stage of adult development, the self-authored mind.

Summary

West Point graduates are expected to lead and win in volatile and complex environments. TACs integrate the breadth of cadet experiences and build systems at the group level to mold the Army's future leaders. Assessments from across the faculty combined with objective data from the classroom can lead to valuable discussions to make meaning for young adults. Ownership of personal and leadership experiences are paramount to their growth. These processes are critical to development and can be replicated across higher education.

20 Military development grades: Assigned letter grades that represent a cadet's performance in a given term. The military development grade is a percentage of a cadet's military program score, which is part of their overall GPA while at the academy.

22 Teaching Russian political discourse

Classroom oral presentation and discussion

Olga Dobrunoff

Introduction

It is a commonly held viewpoint in the communicative approach literature and practices that engaging foreign language learners in collaborative discourse has many didactic advantages in creating meaningful and successful learning experiences under classroom conditions. Extensive theoretical and practical research in cognitive, sociocultural, psycholinguistic, and communicative approaches in pedagogics has shown that interactivity in the foreign language classroom has a positive correlation with learner's satisfaction, performance, and achievement.[1] In these more recent approaches to language learning and teaching, the focus of inquiries shifts to spoken discourse as one of the most effective formats of classroom activities. Practically all interactivities that take place in the foreign language classroom are now considered a well-organized discourse[2] of a certain type and format that could be identified by inspecting their integrative didactic, linguistic, pragmatic, and functional properties. "Discourse has become the basic unit of analysis and teaching. Learners should be now motivated to focus on various discourse features within any specified language activity."[3]

The objective of this teaching note is to discuss how the discourse theory could be used to develop the cadets' discourse and other foreign language competences in the context

1 See Bardovi-Harlig, Kathleen, "Pragmatics and Second Language Acquisition", in *The Handbook of Applied Linguistics*, ed. R. Kaplan. Oxford, UK: Oxford University Press, 2001, 232–243; Bardovi-Harlig, Kathleen and Maria-Tereza, Bastos, "Proficiency, Length of Stay, and Intensity of Interaction, and the Acquisition of Conventional Expressions in L2 Pragmatics", posted 2013. www.academia.edu/5092536/Proficiency_length_of_stay_and_intensity_of_interaction_and_the_acquisition_of_conventional_expressions_in_L2_pragmatics; Berns, M. and Matsuda, P. K., "Applied Linguistics", in *Concise Encyclopedia of Applied Linguistics*, ed. M. Berns. Amsterdam: Elsevier, 2010, 3–13; Coates, Jennifer, "Epistemic Modality and Spoken Discourse", *Transactions of the Philological Society*, 1987. https://www.academia.edu/7231856/EPISTEMIC_MODALITY_AND_SPOKEN_DISCOURSE; Krashen, Stephen D., "Second Language Acquisition and Second Language Learning," Internet edition, 2002. www.sdkrashen.com/content/books/sl_acquisition_and_learning.pdf.; McCarthy, M., Matthiessen, C. M. I. M., and Slade, D., "Discourse Analysis", in *An Introduction to Applied Linguistics*, ed. N. Schmitt. London: Routledge, 2010, 53–69; and Olshtain, Elite and Celce-Murcia, Marianna, "Discourse Analysis and Language Teaching", in *The Handbook of Discourse Analysis*, ed. Deborah Schiffrin, Deborah Tannen, and Heidi E. Hamilton. Oxford, UK: Blackwell Publishing Ltd., 2001, 708.

2 Here, *discourse* is defined as a meaningful, unified, and purposive language communication that evolves as interaction between its participants.

3 Olshtain, Elite and Celce-Murcia, Marianna, "Discourse Analysis and Language Teaching", in *The Handbook of Discourse Analysis*, ed. Deborah Schiffrin, Deborah Tannen, and Heidi E. Hamilton. Oxford, UK: Blackwell Publishing Ltd., 2001, 708.

of two classroom discourses – oral classroom presentation and discussion, and in this way to substantially contribute to our major objective of educating, training, and inspiring cadets to become leaders of character, in developing their ability to think critically and creatively.

Discourse in the foreign language classroom

Classroom oral presentation and discussion (OPD) proved to be among most effective activities in the Russian language classroom. They involve all four types of discourse *(argument, narration*, *description*, and *exposition)* in various degrees and share many features characteristic of other classroom activities such as common discourse community, pedagogical objectives, recurring procedures, etc.[4] In addition, they possess some other features that made them the focus of this paper.

First, they routinely have recurring procedures and common discourse topic because discussion usually follows presentation.[5] Second, they provide an excellent interactive context for grammar and vocabulary introduction and their further usage. Such a context helps cadets understand how Russian phonology, grammar, and vocabulary interrelate with the discourse. It makes easier to understand the interaction of sociolinguistic features and verbal nuances that accompany the OPD discourse and help the cadets acquire competence in shaping and applying communication strategies in Russian in conformity with culturally and socially accepted norms of natural interaction. In the context of Russian language teaching, the cadets need to know that through their participation in classroom OPD they will acquire many essential communicative skills: to read background materials in Russian, to explore new ideas and different viewpoints, to evaluate and develop new knowledge of the country and people of the language they study, to use the Russian language effectively and confidently as the medium of interactivity in delivering presentation and leading a one-on-one or group discussion; and to prepare handouts, visual aids, relevant and thought-provoking questions.

A third (and major for these notes) feature of classroom OPD discourse is the involvement of cadets' comments and evaluations, their personal points of view that require specific language means such as modality and other discourse markers.[6] Presenting their point of view in front of a class in Russian can be a daunting task for the cadets, especially because of the need to convey their statements with an appropriate degree of doubt and certainty. Such epistemic comments are crucial to OPD, where cadets have to distinguish opinion from fact and evaluate their assertions in acceptable and persuasive ways. Their statements must not only indicate the extent of their conviction in the truth, which may range from uncertain possibility to confident certainty, but also convey a suitable degree of respect to the audience. These aspects of language use are generally referred to as epistemic: they enable writers to express their "assessment of possibilities and . . . indicate the

4 The language classroom can easily be considered a unique discourse community because the students and their instructor make up a group that shares many things – a considerable body of knowledge, a specific group culture, an acceptable code of behavior, a common language, a common physical environment, and a common goal.

5 Here, *a topic* is a coherent aggregate of thoughts on a certain subject matter introduced by some participant in a discourse, developed either by that participant or another or by several participants jointly, and then explicitly closed.

6 I use the notion of *point of view* as a reflection of the speaker's own background assumptions, norms, and values, which may be the consequence of the conscious or unconscious representation of a particular ideology.

degree of confidence or lack of confidence in the truth of the proposition expressed."[7] Such epistemic comments are often seen as the principal means by which speakers can use language flexibly to adopt positions, express points of view, and signal allegiances.

Practical considerations

Learning to express different degrees of certainty and uncertainty in Russian is a complex task. My experience suggests that getting Russian epistemic means of modality expressions through osmosis could be a long and chaotic process for the cadets – they will certainly benefit from explicit instruction in the classroom.

The instructor's assistance in acquiring the OPD competences and skills could start with providing the cadets with a list of the predetermined topics for presentation assignments that fit the syllabus. To help them with their work on the assignment, the instructor could provide them with a list of suggested sources of related information, which saves the cadets time and guides their work away from deviating from the topic. The cadets should be encouraged to select a topic from the list posted by the instructor. However, if they are not able to choose a topic, they should have an option to select the one that they have some questions about and that interests them the most.

To make topics effective and provocative, they should be prepared in the form of carefully phrased questions avoiding ambiguous or "closed" questions (yes/no questions, questions with only one answer, leading questions). Instead, these should be questions that require the cadets to draw conclusions from their personal experience and their research, provide evidence for their claims, consider the implications of an argument, synthesize seemingly disparate material, and make critical judgments. This will indicate from the onset that what follows in the presentation is one of possible opinions and other opinions are invited for discussion.

The language instructor can help the cadets by modeling effective skills for oral presentation and group discussion by providing them with additional guiding information and specifically designed exercises to practice these skills in a safe environment. In particular, cadets should be familiar with the requirements of a uniform OPD assignment sheet prepared by the instructor as well as a uniform format and structure of this discourse. (See Appendix for a sample presentation.) In order to enrich their vocabulary and motivate its use in the discourse, in addition to mandatory vocabulary, cadets should be provided with a list of suggested functional words and phrases to be used in presentation and discussion. They should cover all stages of a presentation, starting from the attention getters, then moving through topic introduction and supporting points to concluding phrases and a question initiating a discussion. If possible, in the beginning of the academic year, a prepared example of an oral classroom presentation could be delivered by one of the students of the group for others to observe and take notes of its format and structure.

The classroom discourse of discussion can be defined as an exchange of differing opinions, viewpoints, or perspectives on a previously presented topic, enabling the cadets to explore different ideas with the purpose of coming to an informed conclusion. The participants are normally encouraged to explore different points of view and to end their contribution with a personal opinion or comment. Due to the unpredictable nature of

7 Coates, Jennifer, "Epistemic Modality and Spoken Discourse", *Transactions of the Philological Society*, 1987, www.academia.edu/7231856/EPISTEMIC_MODALITY_AND_SPOKEN_DISCOURS

the classroom OPD interactivity format, the instructor needs to be ready to perform as an initiator, procedure facilitator, clarifier, summarizer, social supporter, harmonizer, tension reliever, energizer, and dominator.

On the practical side, some communicative exercises could be suggested to prepare the cadets for participation in the classroom discussion:

Exercise 1: How to agree with the point of view/with other people's ideas ("Two-Step Approach").

Step I: Acknowledge agreement with what was said (e.g.: Well, I agree with the presenter that . . ., I think that's the right way of looking at . . ., the presenter made a good point . . .).

Step II: Complete the utterance with a circumlocution, periphrasis, or repetition of what was stated in the presentation. (e.g.: Definitely . . ., I have to side with you on . . ., I totally agree that . . .).

Exercise 2: How to disagree with the point of view/refute other people's ideas. ("Three-Step Approach").

Step I: Acknowledge strengths (e.g.: I can see your point – however, I can barely agree with the idea that . . ., That is a good point, but . . ., I see what you are getting at, but . . . /It is largely true that . . ., whereas . . .).

Step II: Explain your critique, identify the weaknesses of other people's argument (e.g.: That is not always the case because . . ., That is not necessarily true because . . ., This idea is not supported by evidence . . . /I thought the author meant that . . ., A crucial assumption (condition) is that . . .).

Step III: Conclude with your argument and suggested ways of improvement (e.g.: From what I have read . . ., The statistics seem to indicate that . . ., I think what (author's name) may actually be suggesting is . . .)

The OPD discourse proves a very effective context and environment for an explicit instruction that helps accelerate the acquisition by the cadets of the competences necessary to distinguish facts from interpretation in the information they work with and to use a range of high frequency Russian language modality means to express their points of view. The discussion presented here should be considered an example of interactive methods of teaching a foreign language that encourage interest in the subject, promote the efficient acquisition of teaching material, form patterns of conduct, provide high motivation, strength, knowledge, team spirit and freedom of expression, and, most importantly, contribute to the complex competences of future military specialists.

Appendix

An example oral presentation

Topic: *Михаил Горбачев – первый и единственный президент СССР. Что русские думают о нём сегодня?* (Mikhail Gorbachev – the first and only president of the USSR. What do Russians think of him today?)

Main massage: *Эпоха правления Михаила Горбачева уже вошла в историю – таких глобальных перемен бывший Советский Союз не испытывал за все годы своего существования*. (The years of his ruling made history – never before had the Soviet Union undergone fundamental changes of that proportion.)

Presentation

Point 1. *Начну с того, что Михаил Горбачев родился в крестьянской семье. Оба его деда были причислены советской властью к врагам народа и репрессированы*. (Let me begin with some facts of his biography. He was born to a family of peasants. Both his granddads were declared enemies of the state and subjected to repression.)

Note: Add three to five sentences on the point.
Transition to point 2. → *Интересно начало его политической карьеры*. (The beginning of his political career is quite interesting.)

Point 2. *Жизнь и политическая карьера будущего генсека могли сложиться совсем иначе: Михаил Горбачев запросто мог возглавить Комитет государственной безопасности. Дважды его кандидатура рассматривалась для перехода на работу в КГБ*. (The life and political career of the future General Secretary could have been shaped quite differently. Mikhail Gorbachev could have become head of KGB – his was considered for the position two times.)

Note: Add three to five sentences on the point.
Transition to point 3. → *Несколько слов о са́мом значимом событии в его карьере*. (A few words about the most important fact of his career.)

Point 3. *Большую роль Михаил Горбачев сыграл в объединении Германии. Именно благодаря ему исчезли Берлинская стена и граница между ГДР и ФРГ*. (Mikhail Gorbachev played a significant role in German reunification. It was all thanks to him that the Berlin Wall disappeared between the GDR and FRG.)

Note: Add three to five sentences on the point.
Transition to point 4. → *Его карьера могла закончиться трагически*. (However, his career could have ended tragically.)

Point 4. *За несколько дней до добровольного ухода в отставку в декабре 1991 года в отношении Горбачева было возбуждено уголовное дело по статье "Измена Родине"*. (A few days before his voluntary resignation in December 1991, a criminal case was opened against him for "Betrayal of the Motherland.")

Note: Add three to five sentences on the point.

Conclusion

Review main points: *Напомню основные моменты моей презентации . . .* (In conclusion, I want to recap the most important facts of my presentation.) Add three to five sentences on the point.

Wrap the presentation up: *Из сказанного можно сделать вывод – эпоха правления Михаила Горбачева вошла в историю как эпоха глобальных перемен. Однако отношение к нему в России неоднозначное*. (From what was said, we could conclude that Mikhail Gorbachev's rule will be remembered as a time of global change.)

Note: Add three to five sentences on the point.

Close: *Спасибо за внимание. Буду рад(а) ответить на ваши вопросы, если они есть*. (Thank you for your attention. I will be glad to answer your questions.)

A question to the audience: *Кем был Горбачев больше – демократом и реформатором или партийным аппаратчиком, пытающимся сохранить статус кво в России*? (What was Gorbachev more – a democrat and reformer or a party apparatchik desperately looking ways to keep the then-status quo in Russia?)

23 Enhancing written and oral analysis in a life science course

Literary biologists

Melissa Eslinger, Ryan E. Rodriguez, and Kathleen LeForte

Introduction

The scientific components within a liberal arts education, although required, can present challenging opportunities to cultivate the skills associated with the scientific process. Migrating beyond the memorization of foundational information, it is important to educate students to transition from consumers of knowledge to readers who can synthesize information. A mechanism to cultivate these critical thinking skills is to apply course-specific content and then assess for effective communication to promote intellectual capital. The academic program at the U.S. Military Academy includes a core component with a minimum of three semesters of science, typically completed by the second year of studies. These science courses share two common required courses, general chemistry I and physics I, but offer options for the third course from either chemistry II, physics II, or introductory biology. Students majoring in science or engineering take the second semester of physics or chemistry as part of their required curriculum. While nonscience, technology, engineering, and math (non-STEM) majors may elect to take either of these courses, a substantial portion of this population elects to enroll in the introductory biology course.

This introduction to biology course is specifically designed for nonscience majors; an advanced biology course is offered to those interested in premedical coursework or majoring in life science. This course is broad in scope including traditional components of cellular biology, evolution, heredity, and human physiology. Introductory biology is offered every semester following the initial pilot during the fall of 2016. Subsequent annual enrollment averaged 518 cadets across academic years 2018–2020, representing 47% of the Corps of Cadets taking introductory biology each year. The majority of those enrolled are within their second year of undergraduate studies, having completed the minimum prerequisite one semester of general chemistry. Section sizes are small, ranging from 16–20 students per section, with faculty teaching between two to four sections per semester, to include the laboratory. An inherent component of this third core science option is the fulfillment of a core writing project. For our purposes, we present the project designed for introduction to biology, which reinforces the biology course outcome goal of enhancing scientific literacy.

While several schools of thought differ on how to structure and guide the undergraduate STEM curriculum, a universally essential element is scientific communication and literacy.[1] Perhaps one of the most challenging aspects of this requirement is to engage

1 Gormally, C, P Brickman, and M Lutz. 2012. "Developing a test of scientific literacy skills (TOSLS): measuring undergraduates' evaluation of scientific information and arguments." *CBE–Life Science Education* 11 (4): 364–377.

the nonscience major in the scientific process as they apply critical thinking skills. Students can view a required biology course as a rite of passage where success is evaluated by memorizing large amounts of data for an examination. However, moving beyond the factual memorization into application of knowledge requires higher-order cognitive skills.[2] Practical experience in applying these skills in the context of science provides an opportunity for educators to enhance discipline-specific understanding through the interpretation of a topic that students encounter within their daily lives. Leveraging these examples and requiring the application of course content encourages scientific literacy through practical interpretations and communication.[3]

Scientific literacy, specifically in biology, has been approached through a variety of methods. Some have focused on primary literature from a specific laboratory group over time,[4] while others have focused on the analysis of primary sources as part of a cell biology laboratory project.[5] Students pursuing a career in science must learn to read and interpret primary literature through common threads or journal club style analysis.[6,7] However, due to the complexity of primary literature, we wanted to focus our nonscience majors by analyzing popular media and literature that they encounter in their daily lives. In this way, we sought to address the gap of the application of biology and knowledge synthesis by assessing the cadet's ability to communicate their analysis in writing. We selected key skills within Bloom's-based Learning Activities for Students[8] and nested steps that support the student learning outcomes. As shown in Table 23.1, we illustrate these deliberate ties of cognitive progression to student activities within the project.

Educational goals commonly include achieving a deeper understanding of the relationship of foundational knowledge to everyday life and instilling a culture of critical thinking across disciplines. Within our introduction to biology course, predominantly humanities majors in their final science course at the academy, we designed a project to reinforce classroom concepts in an application-based approach by assessing critical thinking and scientific communication. This project guided students in the dissection of an article of their choosing using specific written guidelines and grading rubrics to stimulate and assess their higher-order cognitive skills. These skills were separately scored for discipline-specific content and writing metrics. Together, scores and surveys from faculty and students suggest that this project and its supporting materials are useful to enhance scientific communication and cognitive progression in a manner that can be adopted within any discipline.

2 Zoller, U. 1993. "Are lecture and learning compatible? Maybe for LOCS: unlikely for HOCS." *Journal of Chemical Education* 70 (3): 195–197.

3 Mcphearson, T, S Gill, R Pollack, and J Sable. 2008. "Increasing scientific literacy in undergraduate education: a case study from "Frontiers of Science" at Columbia University." In *A vision of transdiciplinarity: Laying foundations for a world knowledge dialogue*, by F Darbellay, M Cockell, J Billotte and F Waldvogel, 146–159. EPFL Press.

4 Hoskins, S, L Stevens, and R Nehm. 2007. "Selective use of the primary literature transforms the classroom into a virtual laboratory." *Genetics* 176 (3): 1381–1389.

5 Woodham, H, G Marback-Ad, G Downey, E Tomei, and K Thompson. 2016. "Enhancing scientific literacy in the undergraduate cell biology laboratory classroom." *Journal of Microbiology & Biology Education* 17 (3): 458–465.

6 Sato, B, P Kadandale, W He, P Murata, Y Latif, and M Warschauer. 2014. "Practice makes pretty good: assessment of primary literature reading abilities across multiple large-enrollment biology laboratory courses." *CBE–Life Science Education* 13 (4): 677–686.

7 Kovarik, M. 2016. "Use of primary literature in the undergraduate analytical class." *Analytical and Bioanalytical Chemistry* 408 (12): 3045–3049.

8 Crowe, A, C Dirks, and M Wenderoth. 2008. "Biology in Bloom: implementing Bloom's taxonomy to enhance student learning in biology." *CBE-Life Science Education* 7 (4): 368–381.

Table 23.1 The higher-order cognitive progression through this writing event is ascribed to select student learning outcomes during this project[9]

Overall Goal: Enhance scientific awareness and critical thinking skills	
Cognitive Progression	*Student Learning Outcomes*
Knowledge/Comprehension	• Summarize the main idea of the article. Include relevant background for those unfamiliar with the topic.
Application/Analysis	• Explain the relevance of the article to the course. • Describe how the article is related to cadet life and future military service.
Synthesis	• Relate article to course objectives from (3) distinct lessons. • Propose a new experimental question.
Evaluation	• Prepare a written summary and analysis of the article. • Interpret biological significance of the article.

Methods

Development of the project and guidelines

The standards for undergraduate biology education[10] describe the importance of iterative written scientific communication opportunities. With daily exposure to news feeds and popular media, we wanted to highlight the relevance of science to their daily lives. Initially, we approached this by focusing the nonscience majors in the deliberate and guided progression through a primary research article of their own choosing. However, while this was effective for scientifically inclined students, the instructor requirements were high for this type of analysis. We retain this approach[11] for our science majors but developed a parallel project that was less cumbersome for core faculty.

Maintaining goals of enhancing metacognitive skills through Bloom's-based Learning Activities,[12] we had students describe or summarize background knowledge in lower-order fashion and progressed to higher-cognitive interpretation of the relevance of the data to their coursework and future careers. Students began with selecting popular magazine articles, published within one year and at least 500 words in length, to highlight the ubiquity of biology across a wide range of interests. From here, they queried scientific literature to find an example of how scientists were learning more about the topic. Students prepared a written summary synthesizing the current understanding of the topic from other sources. Importantly, they related their findings to three distinct lesson objectives from the course. In doing so, they collected information, synthesized material, and related it to foundations within the course. This transitioned students from consumers of

9 The higher-order cognitive progression through this writing event is ascribed to select student learning outcomes during this project. Select actions modified from composite of Bloom's-based Learning Activities for Students.

10 Brewer, C, and D Smith. 2011. *Vision and change in undergraduate biology education: a call to action*. American Association for the Advancement of Science, 14–15. www.visionandchange.org.

11 Eslinger, Melissa, and Elizabeth Kent. 2018. "Improving scientific literacy through a structured primary literature project." *Bioscene* 44 (1): 13–27.

12 Crowe, A, C Dirks, and M Wenderoth. 2008. "Biology in Bloom: implementing Bloom's taxonomy to enhance student learning in biology." *CBE-Life Science Education* 7 (4): 368–381.

knowledge to examiners of the discipline as they analyzed conceptual relationships and looked at the discipline in new ways.

Secondary to the discipline-specific skills described earlier, we designed this analysis to assess metrics established by our West Point Writing Program (WPWP),[13] mentioned elsewhere within this volume. These proficiency metrics address criteria of substance, organization, style, mechanics, and documentation to assess whether students can logically express ideas in a structured fashion. Their ability to coherently organize and present a compelling argument is measured in two manners: the first are scaled points for each of the five criteria, and the second is an overall designation of excellent, satisfactory, marginal, or not proficient. These metrics are further used in partnership with our Mounger Writing Center, within the WPWP, to identify struggling students early in their training who may benefit from additional educational resources.[14] With our student population representing every state within the nation and select foreign countries each year, there is great diversity, and students across all academic needs can benefit from the writing center resources during any portion of their writing projects. For our purposes, each aspect of the assessments, the scientific logic and the stylistic or writing mechanics were scored separately.

Study population and classroom implementation

Our students within this analysis (n = 240) represent one semester of the introduction to biology course for nonscience majors. Prior to the study, exemption for the use of human subject in research was granted by the Human Research Protection Program (HRPP 19–044). Faculty familiarized students with the project during the first lesson by providing detailed handouts and grading rubrics,[15] which standardized the expectations and assessment over the course of the semester.

Key assessment strategies

Assessing discipline-specific content

Students were initially prompted to generate a brief summary, using common terms, as a stand-alone description. Students provided background – as if speaking with someone unfamiliar with the topic – as they analyzed the relevance to their lives. The relevance also involved identifying and relating their article to three unique lesson objectives, thus drawing parallels or analogies between biological phenomena covered in the course and popular scientific literature. Highlighting items that were otherwise challenging to interpret in the article prompted students to face their own ambiguity within the discipline. Finally, students considered the references and whether citations involved apparent bias or conflicts of interest.

13 USMA. 2018. "The West Point Writing Program Signature Writing Events." *Mounger Writing Center*. December 28. https://westpoint.edu/centers-and-research/west-point-writing-program/signature-writing.

14 USMA. 2018. *Overview of the Mounger Writing Center*. Accessed December 28, 2018. https://westpoint.edu/centers-and-research/west-point-writing-program/mounger-writing-center/william-mounger.

15 Eslinger, *et al.* 2020. *Expectations and assessment rubric*. Available on the companion website.

Assessing stylistic components

Stylistic assessments[16] considered substance, organization, style, mechanics, and documentation. Briefly, substance focuses on word precision and logic while the overall organization evaluates the cohesive flow of the story. Style considers the formatting and appropriateness of the tone. Mechanics focuses on the clarity and precision of the argument. Finally, the appropriate use of documentation completes the writing assessment, separate from the discipline content. These five categories generated an overall score between zero and 50 with subcategories of excellent (9–10 points); satisfactory (7–8 points); marginal (5–6 points); not met (<5 points). Cadets failing to achieve a total of 25 points (of 50 possible) failed to meet writing standards and were referred for further assistance from our writing center.

Assessing through surveys

Students were provided optional surveys near the end of the course regarding the project design and key components (n = 180, 75% of the course). Faculty surveys (n = 6) were simultaneously submitted to determine collective trends.

Results

In total, students who adhered to the published guidelines and rubrics scored very well (Table 23.2). The initial low-stakes (5 points) event of article selection was largely successful (96% average). As shown in Table 23.2, on average we determined that students performed well on the analysis of scientific content (92%, with a range of 42–100%) and grammatical components (89%, with a range of 68–100%). While the averages were not statistically different, it is interesting to note that the range included slightly lower scores in scientific content. Whether these students were slightly better at writing and misinterpreted the underlying science remains to be seen. Future studies could explore whether students who struggle with science face similar issues with writing.

An area where students struggled was the ability to crosswalk article content to a lesson objective. Students who had difficulty relating the article to a lesson objective were unable to conceptualize science in context. Others who could make these conceptual

Table 23.2 Student performance on the discipline-specific and writing metrics

	Select Article	*Scientific Analysis (Discipline-specific)*	*Writing Analysis (Style & flow)*
Max Points	*5*	*70*	*50*
Average (pts)	4.85 (±0.8)	64.9 (±7.1)	44.6 (±5.3)
Average %	96.9%	92.7%	89.2%

Average scores for each portion are shown (± standard deviation of the average) along with the average percentage for that event (n = 240 students).

16 USMA. 2018. "The West Point Writing Program Signature Writing Events." *Mounger Writing Center*. December 28. https://westpoint.edu/centers-and-research/west-point-writing-program/signature-writing.

leaps scored well on the scientific analysis and presented coherent arguments. For these, the deliberate ties to course material illustrated a definite cognitive progression.

Focusing on the scientific content, students primarily lost points for misinterpretation of scientific content or omitting specified components of the rubric. It was important for faculty to emphasize the adherence to the three-page limit. As this was an individual event for students, limiting the length allowed faculty time to assess and provide meaningful feedback on both their cognitive scientific skills and their application of scientific writing for the variety of selected topics. Using secondary sources made the assignment less intimidating than primary literature, particularly for an audience of non-STEM majors (see Tables 23.3 and 23.4).

A secondary mechanism to assess scientific literacy was surveys. Faculty and student surveys were limited to our internal cohort. Preliminary faculty and student feedback suggest that this project is an effective approach to improve scientific literacy and higher order critical thinking skills (Tables 23.3 and 23.4). Additionally, instructors noted that students who chose topics that interested them personally were more enthusiastic and better prepared to complete their written analysis. Students also highlighted this as a favored component and that provided guidance and rubrics were helpful (Table 23.3). However, students reported only slightly above-average gains in scientific literacy and critical thinking, although they were able to execute these skills, perhaps without

Table 23.3 Student survey of the project design

Pick Own Topic	*Grading Rubric*	*Written Guidance*	*Relate Article to Course*	*Scientific Literacy*	*Critical Thinking*
4.5 ± 0.70	4.3 ± 0.82	4.3 ± 0.86	3.7 ± 1.05	3.7 ± 1.02	3.5 ± 0.98

On a scale from 1 to 5, with 5 being the highest, students identified how useful the provided products were for completion of the assignment. Averages are expressed as mean ± standard deviation (n = 180).

Table 23.4 Faculty assessment of the project impact

Students were able to:	*Prior*	*After*
Recognize and apply scientific content to contemporary literature	2.0 (±0)	3.67 (±0.47)
Apply the scientific method	2.33 (±.47)	3.33 (±0.47)
Project Design:		
It was a benefit for cadets to self-select the topic of the article		5.0 (±0)
Grading rubrics were useful for the assessment of this project		5.0 (±0)
Specific written guidance was useful for the assessment of this project		5.0 (±0)
Students were able to relate the article content to three distinct lesson objectives		4.0 (±0)
This project is effective in improving scientific literacy		4.0 (±0)
This project is effective in improving critical thinking skills		3.33 (±0.47)

Criteria were evaluated on a scale from 1 to 5, with 1 being the lowest and 5 being the highest. Faculty perceptions were simultaneously collected after the course and reflect assessments of student abilities before and after the project along with overall project design. Averages are expressed as mean ± standard deviation (n = 6).

realization. While the faculty feedback directly relates to the project, it is possible that students' gains or motivation are due to unrelated aspects of the course or learning attributable to their instructors.

Summary

Reports continue to suggest that scientific literacy needs promotion to enhance critical thinking skills across disciplines.[17,18] Building on biology coursework, this directed approach to analyzing contemporary science follows the scientific process from research question to conclusion as it relates to lesson material. With careful realization of the relationship of course concepts to everyday life, students transition from passive to informed readers that make deliberate connections. For this audience, the ability to summarize the main idea of the article in common terms, as if they were speaking with family members, illustrated an ability to synthesize, relate (three distinct lesson objectives), and communicate findings in an organized fashion that supports the integration of the article into the scientific discipline.

We found this activity allows for the exploration of scientific processes outside of the classroom, with an easily adopted hands-on approach to increasing scientific literacy. This project encouraged the progress from consumers of knowledge to the creation of new information through the synthesis of higher-order cognitive skills. While the direct gains could be further examined, our study suggests enhanced scientific literacy. As such, this project can be adapted and incorporated across disciplines to improve discipline-specific literacy and promote communication skills.

17 Tabor, D, and E Jakobsson. 2004. *The BIO2010 Revolution: what it is, why NIGMS is helping to lead it, and why you should join it*. National Institute of General Medical Sciences, NIGMS Minority Programs Update.

18 Varela, M, M Lutnesky, and M Osgood. 2005. "Assessment of student skills for critiquing published primary scientific literature using a primary trait analysis scale." *Microbiology Education* 6: 20–27.

24 Enhancing the foreign language classroom through experiential learning

Connecting and reflecting

Sherry A. Maggin, John M. Pendergast, and Julia M. Praud

Introduction

West Point's Department of Foreign Languages provides students with collaborative experiential learning opportunities based within the surrounding community in order to bring multifaceted language, cultural, and civic engagement beyond the classroom for many of their students in a variety of language courses. In this paper, we will highlight examples of the various ways these students in beginner Russian, intermediate Spanish and advanced French engage with the local and regional community in educational and noneducational settings. We will discuss the history of these engagements and share instructor impressions as well as impressions from student participants and community partners concerning learning outcomes and the benefits to both our students and the community. In all three examples, the majority of students were taking the course to fulfill a core requirement. The number of students who participated in each experiential learning initiative varied from as few as ten to as many as 120 at a given time.

Experiential learning is a dynamic learning tool widely utilized in various disciplines.[1] Experiential learning is a process that brings together concrete experience and reflective observation.[2] There are many ways for students to engage in experiential learning, as identified by Furco,[3] including volunteering, community service, internships, and service-learning. In describing how service-learning differs from other forms of experiential learning such as volunteerism and community service, Furco explains that "service-learning programs are distinguished from other approaches to experiential education by their intention to equally benefit the provider and the recipient of the service as well as to ensure equal focus on both the service being provided and the learning that is occurring."[4] This type of learning combines community-based volunteer experience with activities tailored to elicit reflection on the experience integrated into the content of an academic course. Additionally, this type of course promotes greater civic engagement with local, regional, or even virtual communities.

1 Andrew Furco, "The community as a resource for learning: an analysis of academic service-learning in primary and secondary education," in *The Nature of learning: Using research to inspire practice*, eds. H. Dumont, D. Istance and F. Benavides (Paris: OECD, 2010), 228–229.

2 Alice Y. Kolb and David A. Kolb, "Learning styles and learning spaces: Enhancing experiential learning in higher education," *Academy of Management Learning & Education* 58, no. 2 (2005): 194.

3 Andrew Furco, "Service-Learning: A balanced approach to experiential education," in *Expanding boundaries: Serving and learning*, eds. Corporation for National Service (Washington, DC: Cooperative Education Association, 1996), 2–6.

4 Furco, 5.

In terms of the language classroom, experiential learning is a natural fit for instructors and students who are interested in and searching for concrete and deliberate engagement with the target language community. In fact, the National Standards Collaborative Board includes "Communities" among the goal areas of the World Readiness Standards for Learning Languages, arguing that "learners use the language both within and beyond the classroom to interact and collaborate in their community and the globalized world" and that "learners set goals and reflect on their progress in using languages for enjoyment, enrichment, and advancement."[5] By extending the classroom into the community, students gain more exposure to the target language and culture in an authentic way that the classroom experience may not always be able to provide. By placing this into a service-learning model, they also engage in outreach in the local community, providing a specific service to a community partner. Community partners often work hand in hand with the course instructors and service-learning offices to coordinate a volunteering program that best suits their needs. Students reflect on the experience, which typically not only addresses the experiential component but also affords students the opportunity to make unique observations about language and culture.

Service-learning, however, most often relies upon a sustained semester-long service commitment, requiring a great deal of time and flexibility for successful integration into a course. Unfortunately, some courses and even college programs may not be able to accommodate these requirements. Here at West Point, for example, cadet time is highly structured, including academic, physical, and military training and leadership responsibilities. Regulations at the academy are similar to those of active duty soldiers, precluding autonomous scheduling and transportation. A traditional service-learning model is not possible as a result of these significant limitations. Therefore, our approach aims for a one-time, quality experience for the learner and the community partner in lieu of a more sustained engagement throughout a semester. Our style of community engagement incorporates many of the key elements of service-learning, including experiential learning, robust and continuous relationships with community partners, and deliberate inclusion in the academic structure of the course, primarily through reflection. It also provides an effective solution for instructors facing similar logistical constraints while demonstrating the value of incorporating not only a form of experiential learning but one that approximates the service-learning model. Although specific groups of students only participate in one community visit per semester, the partnerships with the community are longstanding, mutually beneficial relationships developed over several years, demonstrating a sustained service commitment between the course and the community partner.

Bilingual in the Bronx: Spanish experiential learning

New York City and its greater metropolitan area are rich in diversity, including many people who speak Spanish as their first language.[6] In the spring of 2014, an intermediate level Spanish course established a community partner relationship with a charter academy in the Bronx, which was identified through the lead instructor's alumni network, and this

5 The National Standards Collaborative Board. "*World-readiness standards for learning languages summary*," ACTFL, 2015, www.actfl.org/publications/all/world-readiness-standards-Learning-languages.

6 For more information about the diversity of New York City, see www.worldatlas.com/articles/how-many-languages-are-spoken-in-nyc.html and https://elalliance.org/programs/maps/.

partnership continued through the spring of 2018. This partnership afforded West Point cadets, all L2 learners of Spanish, the opportunity to work with Spanish-speaking students who were L2 learners of English. A language exchange of this type in an educational setting is common in many language courses with an experiential learning component, as it has the potential for a symbiotic relationship between the L1 and L2 populations.

Cadets enrolled in the intermediate-level Spanish conversation course visited the school for a one-time visit each spring. The community partner drove the structure of the visit, including preparing a schedule and identifying the classes and experiences in which the cadets would participate to best support the students at the school. During the visit, cadets assisted the fifth- through eighth-grade students, primarily English language learners, in their language arts and mathematics classes. Students identified as "rising leaders" were also invited to eat lunch with the West Point cadets, where the discussion ranged from the language learning experience and cadet life to likes, dislikes, and other interests. These interactions were planned by the community partner as the best opportunities for interaction and impact among their student population, as our cadets represented students who are language learners but also college students and future members of the military, two aspects that the partner felt might serve as inspiration to the student population.

The connection of this visit to the Spanish curriculum has evolved throughout the partnership. During the 2014 iteration, cadets completed a short reflection paper about the visit in which they discussed the challenges of learning a new language, the value of mentorship and education, and the importance of the new perspectives they gained through the experience. Reflecting on language learning, one cadet expressed that while it was challenging at times to understand the students, "it also helped me realize that I probably present the same challenge with Spanish, as lack of proficiency in a language can lead to lack of confidence."[7] Another student indicated that they had a greater appreciation for the challenge of learning a language: "This trip to the Bronx was an amazing experience because not only did the kids get to hear about opportunities and why being bilingual is advantageous to them, but we got to have a greater appreciation of how hard it is to come into a country and pick up the language."[8] These reflections represent a key component of the experience in that students gain a greater awareness of themselves and others as language learners and of the unique challenges a person may experience while learning a language. In subsequent years, the visit was closely tied with course material related to lifelong language learning and Spanish language speakers in the United States. Although there was no explicit reflective component, students still found great value in the experience and shared comments like that about the 2014 experience with instructors. As an experiential opportunity rooted in service to the community, this experience provided both students and the community partner the tangible benefits of interacting with the target language community through civic engagement.

Middle school in Monroe: French experiential learning

For students studying French at the advanced level, the lead instructor collaborated with a community partner about 30 minutes away at a local public middle school. Unlike the Spanish example, the cadets are not interacting with a population of native speakers but

7 Spanish Student 1, May 2014.
8 Spanish Student 2, May 2014.

rather seventh- and eighth-grade middle school students in their first or second year of learning French. In developing this initiative, the middle school teachers expressed a need for language models for their students, and advanced students of French were a natural choice. As L2 learners themselves, many of the West Point students can identify with these middle schoolers, because not too long ago, they were also beginning their study of French. While not native speakers of French, the cadets are conversational and possess a certain level of comfort with the language. Their experience in the language makes them ideal role models for these young learners because the cadets represent the very possible and very attainable results of their language study.

For the past seven years, West Point cadets have had the opportunity to interact with middle school students, faculty, and staff in a variety of settings throughout the school day. Although their primary focus is the foreign language classroom, these students have also engaged in US history, physical education, Special Olympics, the library, lunch and recess. Members of the school community look forward to this visit each fall, welcoming them warmly at the first sight of their uniforms. Continuity is created in part thanks to the uniform because the cadets are seen as a cohesive group rather than as individuals. The excitement and positivity surrounding the presence of the cadets at the school and the commitment to continuing the partnership are evident in correspondence with the West Point lead instructor:

> What an amazing day! Thanks so much for allowing me the opportunity to have the cadets spend some time in my classes. It was a rewarding experience for my students and myself. . . . I hope to be part of this again next year![9]

The cadets' primary task is to plan and execute two different lessons: one for the seventh-graders and one for the eighth-graders. There are six classes, three for each level, representing around 150 middle school students with whom the cadets will interact in the foreign language classroom setting. For the seventh-grade classes, the cadets prepare presentations on Francophone countries in English at the request of the teacher. This is followed by a trivia-style activity, which cadets both prepare and lead, teaching the students the rules and giving them simple French sentences to use with the game. The countries chosen often reflect places that these cadets have visited, either with their families or through West Point language immersion programs, making the presentations highly engaging and impactful for their young audience. In reflecting on this impact in correspondence with the West Point course director, the middle school teacher noted,

> First and foremost, the middle schoolers get to see where languages can take you. Those presentations the cadets did on places they'd visited made the benefits of studying foreign language and cultures instantly obvious. There was "Look! You can go here! And you can do this! Because WE did."[10]

The lesson the cadets create for the eighth-grade students is based on the vocabulary the middle schoolers are currently studying. During one visit, the unit revolved around colors and clothing items. After refamiliarizing themselves with the vocabulary, cadets created

9 French Community Partner 1, email message to author, November 2019.

10 French Community Partner 2, email message to author, January 2016.

a team-centered, information gap activity to practice the vocabulary with the students. During this fast-paced activity, the cadets and middle schoolers solved a problem together while working exclusively in French. More recently, cadets taught the middle schoolers how to give and receive directions in French. The cadets felt they would be able to give more individualized attention to each student with smaller groups. This time, instead of doing one large activity with the entire class, this group of cadets decided to create three distinct activities through which the middle schoolers would rotate during the class period.

This community-based experience is connected to the West Point French curriculum in several ways. First, the focus of one of the course units – the Francophone world – serves as the basis for the seventh-grade lesson. Second, the cadets use their French language skills as they work together to prepare the activities for the visit, as well as during the visit itself. Finally, cadets write a reflection about the experience in French in preparation for an in-class discussion that is conducted in French. Having to prepare a written version of their reflection allows students to process the experience of the day and articulate it in French prior to speaking about it in class.

For most students, this represents the first time they will have used French while leading a task and perhaps their first time serving as a language-learning model for younger students. It is not uncommon for them to be surprised by how much their French has progressed since they were in middle school or high school. In addition, this experience forces them to increase their accuracy to avoid making mistakes in front of the students. In one reflection, a cadet noted that "speaking French in front of the kids showed me how much French I have learned and how much I still have to learn."[11] Their reflections also convey their perception of the overall value of interacting with the community partner. As another cadet noted, "it is important for us to get out into the community. By talking to and interacting with people in the community, we can build connections for the future and improve relationships."[12] Although not assessed formally, the fact that this community partner has continually renewed its invitation to the cadets for the past seven years is evidence that the cadets are fulfilling the goal set before them of being language-learning role models for these seventh- and eighth-grade students while making positive connections with their local community.

Brighton Beach memoirs: Russian experiential learning

West Point is fortunate to be located near the thriving Russophone community of Brighton Beach, a little less than two hours away by bus. Visits by cadets studying Russian to Brighton Beach date back to the 1990s. Until 2008, the visit was usually undertaken as a kind of L2 scavenger hunt, where cadets would ask willing strangers on the street a list of questions. During one of the usual visits, the lead instructor approached the director of the local Russian cultural center, Ms. Sue Fox, and asked whether she thought the patrons of the center, most of whom were Russian language speakers, would be interested in sitting down and talking with West Point cadets. Her response was a very enthusiastic yes, and since that time, the relationship with the Shorefront Y has been a sustained and evolving

11 French Student 1, November 2018. Although the cadets wrote their reflections in French, they are offered here translated by the course director.

12 French Student 2, November 2018.

partnership.[13] It bears noting that the majority of the patrons are elderly Jewish immigrants from the former Soviet Union. This means that the cadets interact with adult L1 speakers rather than with school-aged students, as is the case with the previous two examples.

The schedule of events has evolved over time to meet the needs of the community and accommodate cadet language level. The cadets are provided a short questionnaire in Russian geared toward their current level of ability in the language to elicit information from the community patrons, such as finding out where their community patrons are from, what they do in New York, how long they have been there, their favorite music or books, and their impressions of the community and the United States. There are two unique learner populations who engage with this community partner. In the spring, cadets in their second semester of Russian make the trip. There are usually 100–150 cadets in this group, which demands that the conversations be divided into shifts of about an hour. Those in intermediate Russian, the third semester of the program, make the trip in the fall. This group is usually about half the size of the basic group; thus, they get to spend more than an hour in conversation.

The cadets write a reflection afterward to share how the experience differed from their expectations. Ordinarily, these comments reveal that the experience allows cadets to begin to assess their ability themselves: "I enjoy speaking with the Russian speakers because it provides a good barometer of where my Russian is."[14] Others begin to understand that real success requires that they invest personally in their own language learning: "I think Brighton Beach was a real eye-opener for me. I am nowhere near as accomplished in speaking as I thought. It really showed me just how much more there is to learn and motivated me to work harder."[15] The benefit to the cadets is clear: they have a chance to conduct a sustained oral exchange with a native speaker about topics of personal interest. The benefits to the community are also considerable, especially because it permits them to realize the value of their L1 ability. Shorefront Y Director Sue Fox explains: "Many of the volunteers are actually immigrant students of our adult English as a Second Language program. For them, their perfect Russian is rarely seen as an asset to the United States to which they have immigrated."[16] This experience boosts the self-esteem of the L1 speakers while providing unique native models for the cadets' language development. The yearly visits to Brighton Beach are highly anticipated by the cadets and the community and demonstrate that this kind of experience enhances both language learning and community engagement.

Further demonstrating its value, this one-day, reiterative engagement has evolved in the last two years to encompass a yearlong capstone project for cadets in their final year at West Point. A number of the elderly members of the Russian community served by the Shorefront Y are also members of the American Association of Invalids & Veterans of World War II, many of whom were very eager to share their experiences of the war. Six cadets decided to conduct oral histories of these Soviet veterans. During the fall semester

13 The official name of the Russian cultural center is the Shorefront Young Men and Women's Hebrew Association, or Shorefront Y, for short. According to the center's website: "For over half a century, the Shorefront YM-YWHA has been committed to serving the community of Brighton-Manhattan Beach. Established in the early 1950s, the center has been at the heart of change and immigration in multicultural South Brooklyn." (www.shorefronty.org)

14 Russian Student 1, October 2018.

15 Russian Student 2, October 2018.

16 Ms. Sue Fox, in email message to author, April 29, 2019.

of their senior year, the cadets researched WWII history from the Soviet perspective and devised a survey to elicit information about where the veterans served. The cadets then decided which veteran they wished to interview, based on survey results. Over several weeks in the spring semester, the cadets conducted interviews of the Soviet veterans in Russian, which were recorded on video by the West Point Center for Oral History. They then shared their findings in presentations to their fellow cadets and faculty. Later, this project caught the attention of the West Point Center for Holocaust and Genocide Studies, who saw in it a chance to collaborate on a project with the University of Southern California's Shoah Foundation capturing three-dimensional testimony, using new virtual reality technology. In this way, the work that began as service-based learning for the cadets became a means of exploring personal and cultural history while simultaneously providing an opportunity for these stories to be preserved and shared with a new generation and a potentially much wider audience.

Conclusion

The West Point environment demands a degree of creativity from instructors wanting to incorporate experiential learning. We believe that language courses and programs, such as West Point's, that are unable to implement all aspects of service-learning can still take advantage of the benefits of experiential learning and reflective components. The example of the Spanish, French, and Russian programs at West Point demonstrates that such programs can still achieve constructive benefit for both students and community partners by borrowing and incorporating elements from this type of experiential learning into their language courses.

Adapting elements of the service-learning model offers a highly effective alternative to those unable to incorporate it fully. Although the French program links L2 learners with L2 learners, while the Spanish and Russian programs involve linking L2 learners with L1 speakers, all of the programs serve as catalysts to enhance the language learning process to a degree that even the students themselves recognize. These examples make clear that the effort of incorporating experiential learning, and service-learning in particular, is worthwhile, especially in the foreign language classroom.

For similar programs unable to adopt the service-learning model fully, the inclusion of community engagement along with student reflection are valuable additions to the learning experience. These examples demonstrate the range of possibilities that exist when deciding to include the service-learning elements of experiential learning into a curriculum. It can be incorporated into any stage of the learning process, with adult or school-aged partners. First steps include defining your course goals and determining how this type of learning can help your students reach those goals. Identifying a community partner is an important piece of the puzzle because fulfilling your curriculum goals must be reconciled with meeting the community partner's existing needs. When determining a community partner, our examples demonstrate that these partnerships need not be limited to one type of population, i.e., a school or only native speakers, and instructors should think broadly about opportunities to engage with speakers and learners of the target language. The overall value of even a one-time experiential learning opportunity with a sustained community partner reinforces the bridge between the community and the classroom and offers abundant potential for future projects and relationships.

25 Deliberately integrating teaching, learning, and assessment

The signature work of the West Point Writing Program

Jason O. Hoppe and Colleen G. Eils

Introduction

The West Point Writing Program (WPWP) is woven into the full breadth of the academy's robust curriculum in the liberal arts, sciences, and engineering. Established in 2016 as part of the academy's holistic reimagining of its academic program, the WPWP promotes the guided, iterative practice of writing across the curriculum – not only to produce more effective communicators but to foster more effective learning generally. In doing so, the WPWP has adapted consensus principles of postsecondary writing instruction to the specific needs and circumstances of West Point, including its mandate to prepare cadets to succeed as Army officers.[1] Yet the program's design also deliberately suggests answers to questions that administrators and faculty everywhere routinely face: How should we best coordinate instructional efforts across very different disciplines? How can we better equip overburdened faculty to contribute to writing education amid increasing concerns about time and expertise? How may we more closely align teaching and assessment, and relatedly, how can administrators and faculty better respect, inform, and even streamline each other's work?[2] The WPWP tackles such questions chiefly in two ways: through its pedagogical model, which balances faculty autonomy and curricular coherence, and through "signature writing" that integrates faculty, student, and administrator priorities – teaching, learning, and assessment – to unprecedented degrees. Ultimately, these core innovations make comprehensive writing education feasible and effective for all involved.

Program overview

The stated mission of the WPWP is to set, assess, and support curricular writing standards that advance the study of composition, critical thinking, academic argument, writing pedagogy, and professional communication. This mission assumes that clear, insightful

1 On key principles for college writing instruction, see "Statement of WAC Principles and Practices," International Network of Writing-across-the-Curriculum Programs, 2014 https://wac.colostate.edu/principles/; on the relevance of such principles to enhancing the critical thinking and communication of Army professionals, see Desirae Gieseman, "Effective Writing for Army Leaders: The Army Writing Standard Redefined," *Military Review* 95, no. 5 (September–October 2015): 106–118.

2 See William Condon and Carol Rutz, "A Taxonomy of Writing Across the Curriculum Programs: Evolving to Serve Broader Agendas," *College Composition and Communication* 64, no. 2 (2012): 357–782.

writing is relevant to all disciplines and also that it varies across them; in short, it recognizes that writing education is not simply a function of English classes alone.[3] The standards the program maintains, then, help to ensure continuity and coherence across the curriculum as cadets practice writing in various classrooms and contexts. Organizationally, the program reflects this transdisciplinary reality: formally speaking, the WPWP is a division within the Academy's Office of the Dean, yet its leaders inform and coordinate the efforts of numerous faculty in every academic department who take up the front lines, as it were, of writing education.

The heart of the program thus lies in the curriculum and departments themselves: every academic department houses at least one, often three or four, of the more than 40 courses linked to the WPWP. Eventually, cadets complete eight to ten such courses over their four years at the academy. Much as their counterparts at other colleges, these courses observe – according to their roles in the program-specific curricular standards, which at West Point dictate small class sizes and manageable faculty grading loads – the treatment of writing itself as a topic and practice in classroom instruction, and where possible, the inclusion of writing assignments that encourage a full compositional process, so writers may draft their work iteratively and revise it in response to feedback from multiple perspectives. Nearly all cadets begin with an English course in first-year composition (FYC). Next, they gradually build proficiency in a range of disciplinary contexts as they progress through West Point's sizable core curriculum; most take an average of five courses designated as Writing-in-the-Core (WiC), usually two to three in the humanities or social sciences and two to three in math and science. To develop depth in the conventions of their chosen discipline, cadets take one Writing-in-the-Major (WiM) course in each academic major they choose. Finally, every cadet completes two Writing-in-the-Profession (WiP) courses in Officership and Constitutional & Military Law, capping their remarkably various and sustained development as writers and communicators. Along the way, cadets and faculty alike receive further educational opportunities and support from two key subcomponents of the WPWP: its Writing Fellows Program and Mounger Writing Center, which together offer an assortment of one-on-one consultations, group workshops, seminars, speaker series, and other special events that augment the courses themselves.

How is such a comprehensive approach to writing education feasible? The question takes a finer point in view of the resourcing limits West Point must negotiate, no differently than many other institutions. Administratively, for instance, the WPWP presently consists of only two full-time faculty-administrators, and the majority of faculty teaching courses linked to the program carry four-four teaching loads. Answers to the challenge of feasibility, therefore, for both parties begin with clear guidelines that equip faculty with the flexibility and structure they need to further writing education in their own classrooms.

The pedagogical model: flexibility, structure, autonomy

The WPWP's "pedagogical model" specifies seven broad teaching approaches that to varying degrees inform all courses linked to the program (Figure 25.1). While our model unmistakably channels prevailing ideas in the field – it frames writing as a process and

3 On writing as a "highly complex and situated activity" that entails discipline-specific "ways of knowing," see Michael Carter, "Ways of Knowing, Doing, and Writing in the Disciplines," *College Composition and Communication* 58, no. 3 (2007): 385–418. 386.

Pedagogical Model: Seven Approaches FYC (7/7) I WiC (≥3/7) I WiM (≥4/7) I WiP (≥3/7)
1. Low or No Stakes Writing: Cadets are asked to use writing to engage with and learn primary material in the course. (E.g. brief summaries or reflections, problem statements, discussion questions, reading responses, journaling, learning logs, case briefs, rhetorical or stylistic exercises, etc.)
2. Modeling: Faculty help explain a major writing assignment by distributing and discussing relevant guidelines and examples. (Examples could be accomplished or ineffective, drawn from scholarly or professional writing in the field or from student or faculty writing at USMA or elsewhere.)
3. Planning or Prewriting: Cadets are asked and equipped to complete planning or prewriting activities inside or outside of class in relation to a major writing assignment. (E.g. annotating, brainstorming, freewriting, blogging, clustering, dramatizing, concept-mapping, outlining, etc.)
4. Scaffolding: Cadets are asked to iteratively draft one or more key components of a major writing assignment inside or outside of class. (E.g. theses, hypotheses, introductions, methods or results sections, literature reviews, conclusions, abstracts, charts, tables, figures, or other discrete elements.)
5. Revising in Response to Feedback: Faculty provide cadets with feedback on ungraded drafts or pieces of drafts that cadets may use to revise before submitting a major writing assignment.
6. Peer-to-Peer Workshopping: Cadets are asked to conduct collaborative, team-based conferences or workshops with each other inside or outside of class that centrally involve writing.
7. Reflecting: Cadets are asked to reflect on the strengths and weaknesses of their writing process and products in organized, formal ways. Reflections may be graded or ungraded. (Consider having cadets craft reflective cover letters to accompany major written graded events or providing other opportunities for them to examine their writing critically.)

Figure 25.1 WPWP Pedagogical Model. Note: A course's designated relationship to the WPWP determines the minimum number of approaches faculty employ; faculty are empowered to select the approaches that best suit their discipline and course design.

learning activity best practiced through craft that is varied, guided, and habitual – it also empowers faculty across fields to make their own choices as to how best to incorporate writing in their classrooms, explicitly deferring to their disciplinary expertise and specific experiences.[4] Practically speaking, this supple and supportive administrative posture enables faculty to integrate attention to writing with other course material; by encouraging them to notice ways they already practice writing instruction (at least to some extent), it preempts the frequent objections that writing is either an irrelevant diversion or unaffordable luxury next to essential course "content." The seven approaches we specify also offer structure for faculty who may not claim expertise in writing pedagogy, in part through parenthetical examples that enable them to either name and emphasize teaching practices they already employ or learn to weave writing instruction into their course plans in ways that make sense to them. Regardless, we stress that faculty themselves determine which approaches their courses include, how to meet the intent of those approaches, and how often those approaches occur.

4 For example, process writing pedagogy and writing-to-learn strategies are outlined in Conference on College Composition and Communication, "Principles for the Postsecondary Teaching of Writing," National Council of Teachers of English, 1989, revised 2013, 2015, https://cccc.ncte.org/cccc/resources/positions/postsecondary-writing. See also Julie A. Reynolds et al., "Writing-to-Learn in Undergraduate Science Education: A Community-Based, Conceptually Driven Approach," *Life Science Education* 11, no. 1 (2012): 17–25.

Such flexibility often proves a catalyst for faculty to experiment with their teaching and course design – and to collaborate with the Writing Program leaders as they plan to integrate approaches into their overall course objectives. As other chapters in this volume suggest, such work can also form the basis for discipline-specific contributions to the scholarship of teaching and learning and therein prove mutually beneficial for administrators, faculty, and students. In WiC courses such as biology and probability and statistics, for example, professors have capitalized on writing requirements and responsibilities instituted by the WPWP to broaden disciplinary literacies and promote higher-order cognition, even in introductory courses largely populated by nonmajors.[5]

Because the WPWP encourages faculty to teach and assess writing according to their expertise in their respective disciplines, writing instruction and expectations are hardly uniform; instead they vary across departments, sometimes significantly. Yet we regard such autonomy and variation as a strength: cadets enjoy a diversity of perspectives on their writing and therefore grow to understand communication as integral to – rather than distinct from – disciplinary knowledge. Moreover, acknowledging and leveraging their expertise empowers faculty, many of whom are new to notions of themselves as teachers of writing, and reinforces the structural diffusion of authority that makes the extraordinary breadth of the WPWP feasible. By mutually supporting each other's efforts and respecting each other's distinctive strengths and perspectives, faculty and WPWP leaders coordinate teaching environments that foster truly impactful writing experiences for cadets, nowhere more than in their "signature" work.

Signature Writing Events: instruments, data, processes

Every course linked to the WPWP designates one Signature Writing Event (SWE) each semester. In many ways the hallmark of the WPWP, these events are at once the end-product of the program's pedagogical model and valuable source material for continuing programmatic and institutional self-study. All SWEs are key, individually authored assignments appropriate to the course that offer cadets the opportunity to take greater ownership of their educations. They do so, in part, by building on the ideals of "Signature Work" as defined by the Association of American Colleges and Universities, encouraging cadets to formulate original responses to problems they themselves define.[6] Selected by a program or course director, the basic assignment for an SWE is standardized across the course, while allowing for variation across sections in terms of specific prompts, data sets, or supporting materials. SWEs usually occur later in the semester, after instructors have discussed writing conventions in their classes – and after cadets have practiced them. Given the nature of this design and their prominence, both within the course and from the perspective of the WPWP, signature writing assignments set the conditions for cadets to produce their best work, controlling so far as possible for competing demands on their time and interests. Cadets find still further incentive to do their best in that they are expected to archive their SWEs in an ePortfolio along with, in most cases, a

5 See chapters in this volume by Kevin Cummiskey, James Pleuss, Bryan Adams, Dusty Turner, Randal Hickman, Charles Sulewski, and Krista Watts (Chapter 8) as well as Melissa Eslinger, Ryan E. Rodriguez, and Kathleen LeForte (Chapter 10).

6 Association of American Colleges & Universities, "Capstones & Signature Work," 2018, www.aacu.org/signaturework.

reflective cover letter. In keeping with portfolio-centered practices in higher education, these records allow cadets to track their progress as writers in the context of their honing academic and professional identities; for faculty, such records facilitate the identification of cadets whose writing may warrant special recognition or, alternatively, benefit from additional support.[7]

For both faculty and administrators, moreover, SWEs offer stable measures of students' progress across an array of genres and disciplines. Each year, cadets generate approximately 10,000 SWEs, which their professors evaluate via a dedicated assessment rubric housed within USMA's learning management system. Crucially, these evaluations supply cadets with clear, timely insight into their performance as writers specifically and remain distinct from the grades they also receive – a distinction especially salient in STEM courses where overall marks for the assignment may disproportionately reflect proficiency in areas other than writing, such as quantitative reasoning. Regardless of the course in which the SWE occurs, faculty assess cadet work holistically as well as in five subcategories (substance, organization, style and presentation, mechanics and correctness, and documentation) according to four scores (exemplary, satisfactory, marginal, not proficient). The rubric (Figure 25.2) is designed to take fewer than 90 seconds to complete. Because of rubrics' succinctness and convenience, faculty complete them in exceptionally high numbers; rates customarily exceed 95% each semester. This continually aggregating data

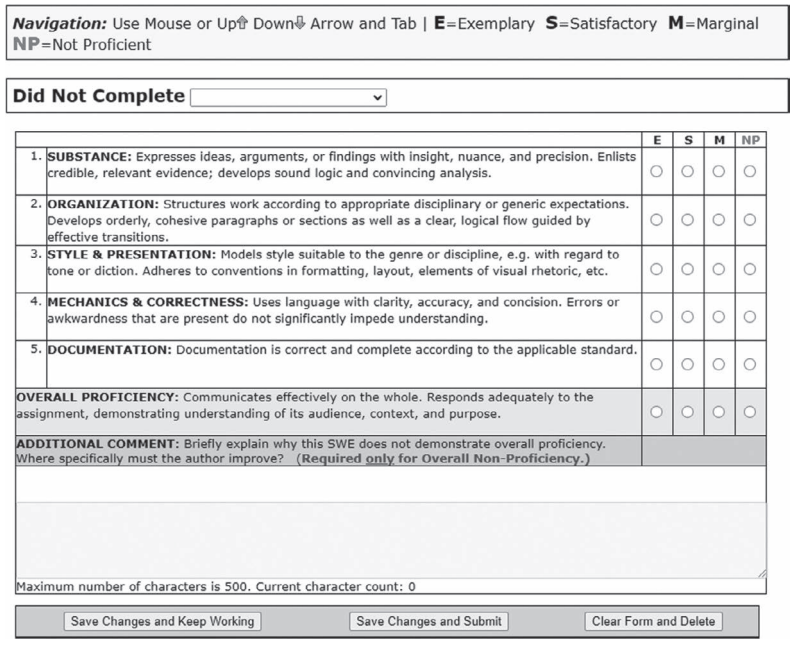

Figure 25.2 SWE Assessment Rubric. Note: Faculty access the SWE rubric in the same learning management system where they submit cadet grades; the rubric is designed to take no more than 90 seconds to complete.

7 On ePortfolios in higher education, see Bret Eynon and Laura M. Gambino, *High-Impact ePortfolio Practice* (Sterling, VA: Stylus Publishing, 2017).

is central to a robust, ongoing evaluation of curricular and programmatic development across departments, academic contexts, and cadet populations.

Institutionally, the evaluations faculty supply through SWE rubrics allow us to gauge the effectiveness of the WPWP and, when paired with other academy data streams, provide granular insight into curricular trends and cadet performance. This data will yield increasingly robust assessments as it aggregates; the graduating class of 2021 will be the first to experience the Writing Program fully and accumulate four complete years of SWE scores. Soon, we will be able to consider how SWE scores for a given course or group of courses (e.g., FYC, WiC, WiM, WiP) change over time, and how SWE scores in broadening courses (WiC) compare to those in depth courses (WiM, WiP). The 2018–19 academic year represents the program's baseline year of record; the 10,051 evaluated SWEs provide an initial, comprehensive view of SWE performance across departments and graduating classes (see Figure 25.3).

The baseline data finds that, on average, cadets perform better and are less likely to earn marginal or nonproficient scores as they progress through the curriculum. The wide variety and disciplinary depth of WiM SWE assignments may account, respectively, for the slightly higher nonproficient and exemplary scores in that category. Increasingly, the WPWP is able to enrich the interpretive contexts of this data through its maintenance of several related data streams: faculty surveys, course syllabi, SWE assignments, and two-page annual reports from course directors of WPWP-linked courses. Over time, this curated archive will reward inquiry in relation to a number of institutional and curricular factors while maturing apace into a rich resource for faculty and department research.

Such research is likely to spring from the ways faculty already draw on SWE assessment data for their own course- and program-level assessments and to better serve cadets majoring in their programs. Each year department leaders receive from the WPWP individual reports that present an aggregate picture of cadets majoring in their programs: WiC SWE performance indicates cadets' progress in their development as agile, multidisciplinary communicators, for instance, and WiM SWE performance provides a snapshot of cadets' facility with disciplinary writing. Rich retrospective comparisons are also

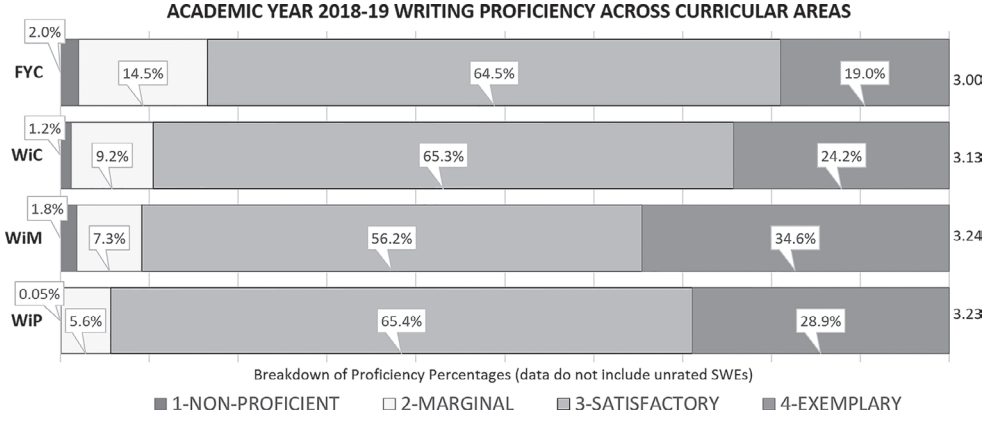

Figure 25.3 Academic Year 2018–19 proficiency across curricular areas. Note: WPWP data streams allow for comparative analysis across academic years as well as graduating classes; AY 2018–19 served as the baseline year of record for SWE data and suggests that cadets perform better on signature writing tasks over time.

possible through the perdurance of USMA's core curriculum. For example, the same FYC and WiP courses bookend every cadet's curricular experience; through SWE scoring in those courses, departments can measure changes in the performance of different classes of cadets, identify trends, and above all determine how best to support majors' development as communicators. They may also orient assessments externally – engineering departments now enlist SWE data in relation to ABET accreditation requirements. The bottom line is that the data we offer departments for their own assessment and research purposes is valuable precisely because they assess writing on SWEs according to their own criteria, which reflect the specific needs of their discipline and courses.

Conclusion

While USMA's institutional conditions are unique, we share challenges familiar to many across higher education: coordinating, resourcing, and sincerely implementing cross-curricular initiatives while also balancing student, faculty, and administrative needs. The WPWP takes up these challenges first in its pedagogical guidelines, which empower faculty across departments to bring their own disciplinary and professional expertise to bear on cadets' development as writers. Just as crucial is lightening the administrative burden on faculty by building assessment into the instructional process through signature writing; we thus encourage extraordinarily high rubric completion rates that deliver more complete, representative snapshots of cadets' progress as communicators than hitherto possible. Ultimately, these innovations feed one another to the mutual benefit of cadets, faculty, and administrators. Ensuring the sustainability of data collection, for example, is critical for institutional and curricular assessment but also valuable for faculty and departments, who can leverage their own data to continually improve and innovate. In turn, better understanding how faculty realize WPWP goals in the classroom and how cadets respond to instruction enables us to make sensible adjustments to our models, and in the end, to better support the cross-disciplinary teams that educate the next generation of Army leaders.

26 Does active learning translate into actual learning in psychology?

Dog Day

Aryn A. Pyke and Tracie M. Caccavale

Introduction

Lecture has been the primary method of conveying information to students since Western universities began.[1] In contrast, "active learning" engages students in interactions with each other and the material via discussion, demonstrations, lab experiments, role play, problem solving, and writing.[2] Students' academic outcomes can improve with active learning.[3] This may owe, in part, to increases in positive attitude[4] and motivation (e.g., intrinsic motivation via feelings of autonomy, competence, and relatedness associated with self-determination theory).[5]

West Point has long embraced active learning practices,[6] and encourages faculty to develop and apply new approaches. The current research reflects one such effort. In a mandatory, general education freshman course, General Psychology for Leaders (Introductory Psychology), we introduced an interactive demonstration of learning processes with an instructor's dog. The research included 12 class sections of about 16 students each from all possible majors.

The use of animals in psychology education is not new – they may be used in 50% of undergraduate institutions.[7] West Point afforded students hands-on experience training rats as recently as the early 1990s.[8] This facility no longer exists, however, which is in keeping with a general decline in the number of colleges retaining animal labs due to financial, regulatory, and other factors.[9] Many students also have ethical concerns

1 Laurence Brockliss, "Curricula." *A History of the University in Europe* 2 (1996): 565–620.

2 James Bonwell and Charles Eison, "Active Learning: Creating Excitement in the Classroom," in *ASHE-ERIC Higher Education Report* no. 1 (Washington, DC: Jossey-Bass, 1991): 5–7.

3 Scott Freeman, et al., "Active Learning Increases Student Performance in Science, Engineering, and Mathematics," *Proceedings of the National Academy of Sciences* 111, no. 23 (2014): 8410.

4 Roman Taraban, Cathy Box, Russell Myers, Robin Pollard, and Craig W. Bowen, "Effects of Active-Learning Experiences on Achievement, Attitudes, and Behaviors in High School Biology," *Journal of Research in Science Teaching* 44, no. 7 (2007): 969.

5 Lakmal Abeysekera and Phillip Dawson, "Motivation and Cognitive Load in the Flipped Classroom: Definition, Rationale and a Call for Research," *Higher Education Research & Development* 34, no. 1 (2015): 4–6.

6 Amy E. Shell, "The Thayer Method of Instruction at the United States Military Academy," *Problems, Resources, and Issues in Mathematics Undergraduate Studies* 12, no. 1 (2002): 27–38.

7 Debra B. Hull, "Animal Use in Undergraduate Psychology Programs," *Teaching of Psychology* 23 (1996): 171–174.

8 Timothy O'Neill (former Director of the Engineering Psychology Program at West Point), in discussion with the first author, May 2020.

9 Scott Plous, "Attitudes Toward the Use of Animals in Psychological Research and Education: Results from a National Survey of Psychologists," *American Psychologist* 51, no. 11 (1996): 1168.

about how lab animals are confined and conditioned.[10] To mitigate ethical and financial issues, active learning demonstrations can be done using a virtual animal on a computer screen, like Sniffy the Rat.[11,12] Such demonstrations are more effective than no interactive demonstration at all,[13] but students find them less effective for learning and less enjoyable than activities with a real animal.[14,15] Notably, interactions with live animals involve more multisensory experiences (e.g., tactile and olfactory), which can improve learning,[16] but are not yet available in most virtual demonstrations. Further, in movies and games, students observe computer-generated imagery (CGI) and virtual agents engaged in a variety of (often unrealistic) actions. We suggest that interacting with a virtual animal doing what it was programmed to do may not be as credible as a live demonstration.

The current research

To achieve effectiveness and student engagement while minimizing cost and ethical concerns, our demonstration featured a real dog that was a beloved pet (vs. a lab or virtual animal), and we eschewed the use of aversive stimuli (punishment). Our use of a regular pet was also intended to make salient that course concepts can be relevant to real life, as it may be harder to relate to and generalize from demonstrations with lab or virtual animals. We sought to assess whether our active Dog Day demonstration would impact the effectiveness of learning in frosh psychology.

Unlike many active learning studies, our baseline condition was not purely passive. Even "regular" West Point classes routinely involve activities such as problem solving and group discussions that traditionally count as "active learning." We thus adopted the term *interactive lecture* for this baseline condition.[17] Our pedagogical goal was to facilitate students' understanding of classical and operant conditioning (two lessons of content in a course with about 34 content lessons). Classical and operant conditioning are two processes that support the training (learning) of new stimulus-response associations and/or new behaviors. Historically, research on these methods focused on learning in nonhuman subjects, including, famously, Pavlov's dogs.[18] Appropriately then, our lesson for this content involved students interactively participating in live training demonstrations with a professor's dog, Lilly.

10 Paul Cunningham, "Animals in Psychology Education and Student Choice," *Society & Animals* 8, no. 2 (2000): 191–212.

11 Tom Alloway, Greg Wilson, Jeff Graham and Lester Krames, *Sniffy the Virtual Rat, Pro Version 5.2*. [Computer Software] (Belmont, CA: Wadsworth-Brooks/Cole, 2011).

12 Jeff Graham, Tom Alloway and Lester Krames, "Sniffy, the Virtual Rat: Simulated Operant Conditioning," *Behavior Research Methods, Instruments & Computers* 26, no. 2 (1994), 134–141.

13 Sandy S. Venneman and Laura R. Knowles, "Sniffing Out Efficacy: Sniffy Lite, A Virtual Animal Lab," *Teaching of Psychology* 32, no. 1 (2005): 66–68.

14 Mirari Elcoro and Melissa B. Trundle, "Student Preferences for Live Versus Virtual Rats in a Learning Course," *International Journal for the Scholarship of Teaching and Learning* 7, no. 1 (2013): n1.

15 Maree J. Hunt and Anne C. Macaskill, "Student Responses to Active Learning Activities With Live and Virtual Rats in Psychology Teaching Laboratories," *Teaching of Psychology* 44, no. 2 (2017): 160–164.

16 Zoltan Katai, Katalin Juhasz and Alpar K. Adoriani, "On the Role of Senses in Education," *Computers & Education* 51, no. 4 (2008): 1707–1717.

17 Jim Eison, "Using Active Learning Instructional Strategies to Create Excitement and Enhance Learning," *Jurnal Pendidikantentang Strategi Pembelajaran Aktif* (Active Learning) 2, no. 1 (2010): 1–10.

18 Robert E. Clark, "The Classical Origins of Pavlov's Conditioning," *Integrative Physiological & Behavioral Science* 39, no. 4 (2004): 279–294.

This research consisted of: (1) an initial study (Study 1) to assess the impact of the activity on objective performance (on a regular course test), and (2) a follow-up study (Study 2) to gain insight into students' subjective recollections of the activity. We wanted to know what they found memorable and whether they felt they understood the concepts (metacognition). We hoped the activity would be memorable not only in terms of incidental episodic details (e.g., the name and type of dog) but that it would also yield lasting semantic memories of the target concepts (e.g., the nature of classical and operant conditioning).

Study 1: Impact on objective test performance

Participants

Participants were students enrolled in a one-semester introductory psychology course that is mandatory for West Point freshmen (PL100: General Psychology for Leaders). The students in the sample ($N = 122$) had been randomly assigned by West Point to one of the eight sections of this course taught by an author in 2018 or 2019. Due to random assignment, sample demographics should reflect cohort demographics at the time (76% male; mean age 19.7 years; 70% white, 15% African American, 9% Hispanic, 8% Asian, 1% American Indian/Alaska native, 1% other). This sample allowed a between-groups comparison of objective performance (test score) between those in the interactive lecture condition (four class sections, $N = 60$) versus those who engaged in the Dog Day active learning activity (four class sections, $N = 62$).

Material: Target content to be learned

The content to be conveyed to all students concerned classical and operant conditioning. The assigned reading was the chapter on learning in the textbook.[19] Classical conditioning piggybacks on innate reflex associations. For example, exposure to food (unconditioned stimulus, UCS) reflexively results in salivation (unconditioned response, UCR), whereas the sound of a bell (neutral stimulus, NS) will not naturally make creatures salivate. If a neutral stimulus is repeatedly paired with food, however, the subject will come to salivate (conditioned response, CR) in response to the bell (conditioned stimulus, CS). Operant conditioning applies to teaching a broader range of (non-reflex) behaviors. For example, when subjects perform a desired behavior (or approximation thereof), this is followed by reinforcement (e.g., a treat), to increase the likelihood that subjects will repeat this behavior in future.

The course guide[20] specified 24 concepts that students were expected to learn: learning, classical conditioning, its components (UCS, UCR, NS, CS, CR), stimulus generalization and discrimination, extinction, higher-order conditioning, systematic desensitization, flooding, operant conditioning, shaping, positive and negative reinforcement, positive and negative punishment, and four reinforcement schedules (fixed and variable interval, fixed and variable ratio).

19 Gregory Feist and Erika Rosenberg, *Psychology: Perspectives and Connections*, 3rd edition (New York, NY: McGraw-Hill, 2017), 284–301.

20 *PL100 Course Guide (Fall Term 19–1): General Psychology for Leaders* (West Point, NY: United States Military Academy, 2018), 64–72. The course guide is available on the Companion Website.

Procedure

Four class sections were exposed to the target content via West Point interactive lectures and the other four engaged in the Dog Day active learning demonstration.

Students in the Interactive Lecture Group experienced two classroom lessons (55 minutes each) – one on classical and one on operant conditioning. Near the start of each lesson, students took a quiz (~ five minutes) on the reading. To structure discussion, the instructor used slides including examples and video clips. Students were encouraged to make contributions and ask questions throughout the class. Specifically, they had to apply their understanding by mapping elements in the examples and clips to relevant concepts (e.g., What is the UCS, NS, CS, CR? What type of reinforcement/punishment was involved?). They were also challenged to generate and discuss possible military examples or applications of classical and operant conditioning. Last, they completed a summary and comparison table on classical and operant conditioning in terms of how learned behavior is: (1) acquired, (2) maintained and (3) modified or stopped.

Students in the Dog Day Active Learning Group had one classroom lesson covering both classical and operant conditioning (55 minutes). As usual, they initially took a short quiz. The faster pace to cover two lessons did not afford as much time for discussion, but at class end, time was invested to collaboratively complete the table to summarize and compare classical and operant conditioning. A second lesson (55 minutes) occurred outdoors on campus with Lilly the dog. The students are pictured with Lilly in Figure 26.1.

Figure 26.1 Photo of students with Lilly during the active-learning session. Permission to use this photo was granted by Cadet Kirby Horne.

To demonstrate classical conditioning, the dog was conditioned to lick her lips to the sound of a bell. She was presented with peanut butter while a bell was rung until she would lick her lips for the bell alone. Given the limited demonstration time, to expedite such conditioning, the instructor began conditioning the dog to associate the peanut butter with the bell once or twice a day for a week prior to student demonstrations. Lilly already knew how to sit, give a paw, and lie down (but not roll over). For operant conditioning, the regularity with which a treat was given for an action (e.g., sit, paw) was varied to illustrate different schedules of reinforcement (fixed vs. variable, ratio vs. interval). To demonstrate shaping, the dog was rewarded with treats for doing incremental parts of the roll-over trick (e.g., lie down, lie on one side, roll onto back, etc.).

Students were actively involved throughout the demonstration. They provided the dog with training stimuli (e.g., peanut butter and bell sounds) and were prompted to identify and state each concept aloud as it was demonstrated. To prepare the dog for the next class and to demonstrate extinction, the class concluded with an attempt to "untrain" some learning from that session (ring bell in absence of peanut butter until it ideally no longer incited lip licking). There were four demonstrations (one for each class section in this condition), all conducted on the same day.

Twenty days after coverage of the target content, all students took a regular, course-wide, multiple choice test including both target content (10 of 50 questions) and non-target control content from four later lessons (observational learning, memory, thinking, and intelligence). We sought to compare performance of the active learning students on target content (from the active dog demonstration) versus control content (taught via interactive lecture) and to compare their target and control performance with that in the interactive lecture (only) group.

Results

In the active learning group, test scores were 8.1% higher on target content (from the dog demonstration, 83.5%) than control content (taught via lecture, 75.4%), $t(59) = 2.58$, $p = .012$. To see if the active group's performance pattern differed from that in the interactive lecture (only) group, we did a 2 (Test Content: Target vs. Control) × 2 (Group: Active Learning vs. Interactive Lecture) mixed ANOVA. A main effect of content revealed higher scores on target than control content overall, $F(1,120) = 30.39$, $p < .001$, including a small gain even within the lecture group that did not experience the demonstration (85.1% target vs. 81.4% control), $t(59) = 2.58$, $p = .012$. This small lecture-group gain suggests that target content may have been slightly more interesting or readily understood in general than control content. Importantly, however, there was a significant interaction of content and group, $F(1, 120) = 4.11$, $p = .045$, indicating that the performance gain for the active learning group (+8.1%) exceeded (more than doubled) the small gain for the interactive lecture group (+3.8%). Planned comparisons suggest that, despite random assignment, the active learning group may have contained more lower-achievers than the lecture group, as indicated by their lower scores on control questions (75.4% vs. 81.4%), $t(120) = 2.64$, $p = .009$, and overall (76.8% vs. 82.1%), $t(120) = 2.35$, $p = .021$. That said, despite the active learning group starting out "behind" (−6% on controls), the dog demonstration enabled them to catch up to their lecture-group peers in terms of performance on target content, $t(120) = .58$, $p = .564$. If we statistically compensate for individual differences of ability across groups by using by total test score as a covariate (mean = 79.4%), the estimated marginal means for target performance in the interactive lecture and active learning groups would be 82.6% vs. 86.0%, respectively, as shown in Figure 26.2.

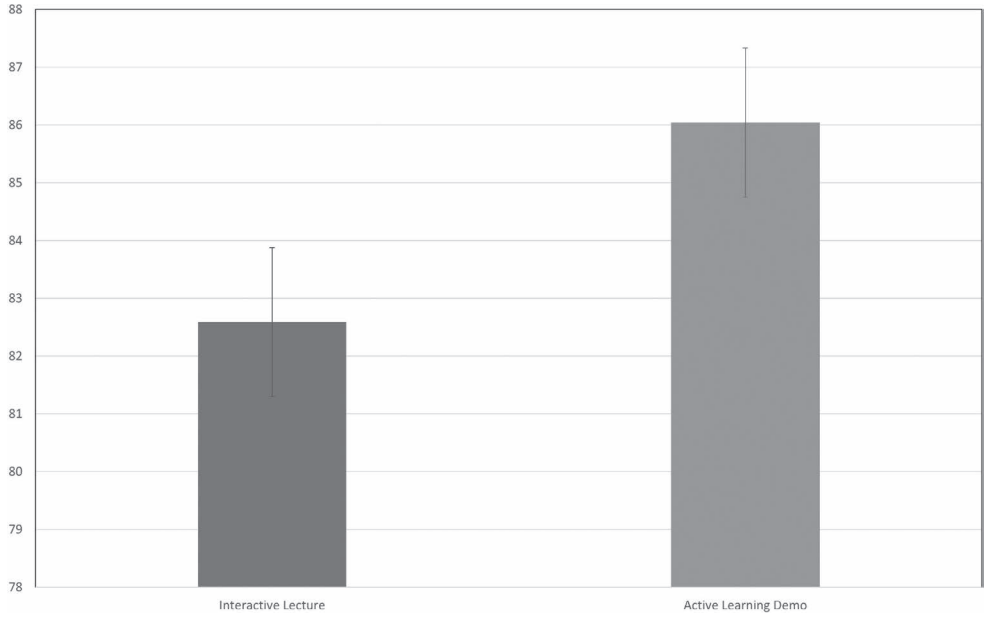

Figure 26.2 Estimated marginal means of percent correct on target test questions when total test score is used as a covariate to control for individual/group differences in ability (bars are std err).

Study 2: Subjective survey

Participants

Participants were students ($N = 58$), distinct from those in Study 1, who were randomly assigned to one of four sections of the freshman psychology course taught by one of the authors in the spring of 2019 (cohort demographics: 76% male, mean age: 19.9 years; 67% white, 16% African American, 8.5 % Hispanic, 7.5% Asian, 1% American Indian/Alaska native, 1% other). This sample was not included in the test analysis in Study 1 because they took a different test.

Procedure

The procedure was similar to that for the active learning group in Study 1, but the outcome measure was a subjective survey (vs. objective test). The survey was given at the end of the term (92 days after the activity). It contained three open-ended questions: Q1. What did you learn or remember about Dog Day? Q2. What terms/ideas from the learning lesson do you remember from Dog Day? Q3. Do you remember what these terms/ideas mean?

Results

Did they report recalling course concepts or incidental details related to the activity? Q1 (What did you learn or remember about Dog Day?) elicited strictly course-related responses in 47% of respondents (e.g., "We learned about conditioning"), recollections

or reactions not directly related to the course concepts in 22% of respondents (e.g., "The dog was very cute"), and responses that included both course-related and incidental details in 29% of respondents. One student (~2%) left a blank response. So, in all, 76% of respondents recalled/reported course content in their Q1 response when thinking back to "Dog Day" (92 days prior). This does not imply that students who reported only incidental details did not also remember course content. We will reexamine this issue in the context of discussing their responses to the next question.

Could they recall relevant concept terms? Q2 explicitly asked students to report terms they remembered from the lesson, but when responses to Q1 or Q3 included additional relevant terms, they were also included in the tallies. Respondents each generated/recalled an average of three concept terms from the active learning lesson (min. of 0, max. of 11 terms, SD = 2.1). The top six responses were: classical conditioning (59% of respondents), operant conditioning (28%), unconditioned stimulus and conditioned stimulus (both 17%), conditioned response (16%), and positive reinforcement (16%). Besides target concepts, a few terms were listed that were not correct (e.g., conditional conditioning, unconditional learning, and operational conditioning).

Did they feel that they knew/recalled the meanings of the terms they listed? It is one thing to recall a term but another to understand and recall its meaning. Q3 asked students: Do you remember what these terms/ideas mean? A student was coded as believing they understood the meanings of their listed concepts if: (i) their response to Q3 consisted of or included the words "yes," "I do," or "most of them" (62% of respondents), and/or (ii) their response to Q3 (or Q1) aimed to demonstrate understanding by including descriptions or definitions of terms or relationships among them (31%). Admittedly, some descriptions were more descriptive than others. Nonetheless, based on these (non-mutually exclusive) criteria, 91% of those surveyed indicated that they remembered the meaning(s) of the term(s) they recalled. Of the five remaining students, two did not answer Q3, two responded "no" and one responded "sorta."

These data on self-reported understanding are encouraging but leave some questions open. First, did students only remember the terms they listed (about three each), or could they recall more terms that they did not list (due to fatigue, space, satisficing etc.)? Second, when students claimed they understood concept terms, did they really understand them? Students' assessments of their own understanding can be inflated.[21] Thus, it is useful to consider both subjective and objective measures of mastery. This survey did confirm that the dog demonstration afforded students not only with recognition memory for the concepts after three weeks (Study 1: multiple choice test) but also with an ability to freely recall some of the relevant concepts after three months.

Discussion and conclusions

Students in the active learning group got higher test scores for target content (from dog demo) than control content (taught via lecture), and this percent gain for target content exceeded that for the interactive lecture group. This is consistent with active learning gains in other science courses.[22] Our gains also seem ecologically valid as we measured

21 Justin Kruger and David Dunning, "Unskilled and Unaware of It: How Difficulties in Recognizing One's Own Incompetence Lead to Inflated Self-Assessments," *Journal of Personality and Social Psychology* 77, no. 6 (1999): 1121.

22 Freeman, 8410.

performance on a course test (vs. artificial assessment created for the study). A gain over West Point's already interactive baseline is noteworthy. Even though West Point is already committed to interactive lectures, there are still potential rewards to be leveraged via new activities that our small class sizes make feasible.

Some limitations for conducting our demonstration include: the need for an instructor to have or borrow a trainable, student-friendly pet; weather dependencies if dogs are not allowed inside; and demonstration size limitations (e.g., ≤ 20 students) to ensure student involvement. Some pretraining of the dog is also required. We also recommend limiting the dog's demonstration load to two classes per day, as she became fatigued and less attentive as the day progressed.

In contrast, virtual animals do not get tired or full. The use of virtual animals or pets are two different alternatives to circumvent financial and ethical issues associated with lab animals, but these two alternatives can be combined to complement each other. Thus, for future efforts, we suggest a novel hybrid approach to capture the best of both worlds: start with a live pet demonstration to capitalize on its enhanced credibility and multisensory benefits. Having thereby germinated positive attitudes and intrinsic motivation, also provide students with an opportunity to pursue further in-depth interaction with a virtual animal that will not fatigue. In collaboration with the Electrical Engineering Department at West Point, another future approach to combining some positive aspects of pets and virtual animals would be to demonstrate conditioning with a robot.[23]

23 David S. Touretzky and Lisa M. Saksida, "Operant Conditioning in Skinnerbots," *Adaptive Behavior* 5, no. 3–4 (1997): 219–247.

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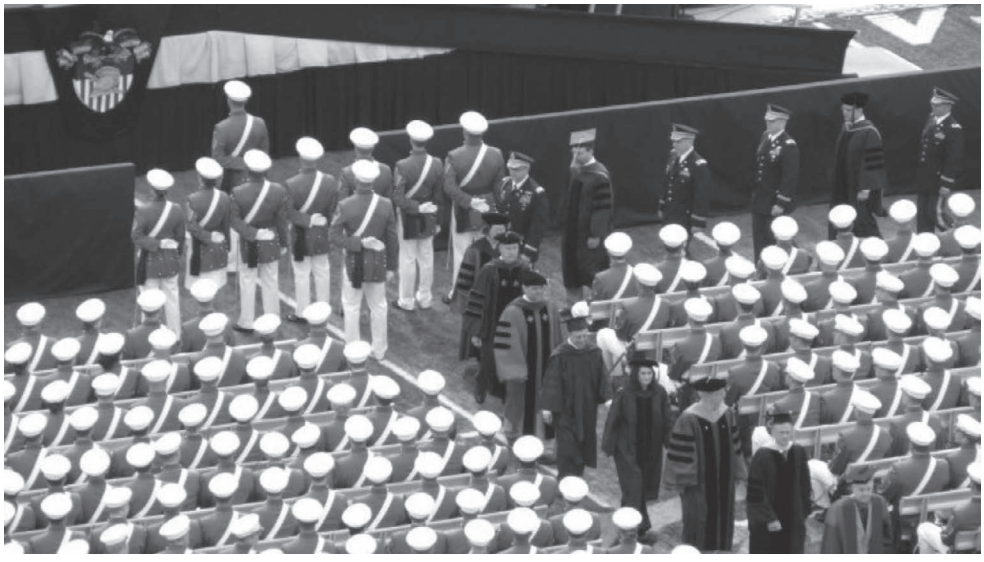
Empirical articles

Jakob C. Bruhl

The six empirical articles included in this section reflect the diversity of West Point's academic program. Included is an article about a unique assessment method that includes individual and group components, an investigation of the primary influences leading to positive academic change, and a study of methods to improve development of foreign language fluency. Other articles investigate the use of a college entrance score to predict academic success, the role that homework plays (or does not play) in learning, and a study about techniques to improve retention, recall, and application of knowledge. Each of these six articles reports important and unique pedagogical findings and provides insights into teaching and learning that are applicable beyond West Point's learning environment. The style of these articles is similar to what one finds in a scholarly journal: they are rooted in the literature, based on rigorous research methods, and report conclusions informed by data.



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27 Developing the cutting edge of assessment techniques

Discovery Learning Assessments

Kristin M. Arney, Kayla K. Blyman, Lisa Bromberg, Jennifer Cepeda, David L. Harness, and Scott Lynch

Introduction

In college classes, it is common to find students asking when they are ever going to use the material in the real world. Instructors as practitioners know that their craft is widely applicable in the world beyond the classroom walls; however, they have historically fallen short of transferring that understanding to students. As teaching methods progress in classrooms, assessments need to evolve along with them. Inspired by a talk, *Assessment: The Silent Killer of Learning*, given by the physicist Eric Mazur, the Balkanski Professor of Physics and Applied Physics and Dean of Applied Physics at Harvard University,[1] we made it our goal to transform our assessments into opportunities for lasting student learning in order to attain higher order learning goals and advance skills to develop students into leaders. To achieve this, we substitute what we call Discovery Learning Assessments (DLAs) in place of traditional midterm exams. These in-class assessments are based on four tenets: (1) assessments should reflect higher-order learning goals, (2) working as a team is an important life skill, (3) effective use of technology is necessary for success in today's world, and (4) creativity in problem solving is paramount.

Assessments should reflect our higher-order learning goals and promote evaluating beyond the base of knowledge that traditional assessments measure. Although DLAs are used with other forms of assessment for determining students' grades, this use is secondary to student learning. DLAs are first and foremost opportunities for learning where students can achieve higher-order learning goals, most importantly, developing abilities to learn on their own.

Students will work in teams throughout their professional lives and our assessments should reflect this reality. With a team component, DLAs can challenge students more deeply than strictly individual assessments as students leverage the power of teamwork to collaborate and learn from each other during a team experience.

Students' success in their careers will depend on effective use of technology. They should use it during major assessments in the same way they will use it professionally. Leveraging the intellectual force-multipliers of software like computer algebra systems and data analysis and visualization packages, DLAs can be based on real and complex data. Therefore, DLAs can be richer and more realistic than traditional forms of assessment.

1 Eric Mazur, *Assessment: The silent killer of learning*. http://ericmazur.com/videos.php.

Finally, as educators we know that the ability to solve a problem creatively is one of the most valuable skills our students can take from our classrooms. Despite this knowledge, many traditional teaching and assessment methods reward the use of predefined and explicitly required algorithms and solution techniques to arrive at answers. With DLAs, we facilitate experiences that allow our students to gain the ability to overcome fixations in mathematical problem solving and reward diverse solution techniques within the situations provided.

Like all courses at the United States Military Academy (USMA), the overarching goal in our course supports developing leaders of character for the Army and the nation who are agile and critical thinkers, able to analyze complex and often ill-defined or unforeseen problems, and make decisions informed by the knowledge, skills, and perspectives of multiple disciplines. We recognized the potential DLAs had for achieving this goal within our classrooms and set out to implement them in our course.

Discovery Learning Assessments

Discovery Learning Assessments (DLAs) are an educational experience consisting of five sequential components. A description of each component and a basic example of each follows. The DLA that appears here as an example is entitled "Belgian Waffles" and is administered during the first week of the course to both introduce students to DLAs and to assess students' abilities to implement the *transform* step of the USMA Mathematical Modeling Process (see Figure 27.1). While this situation may seem contrived

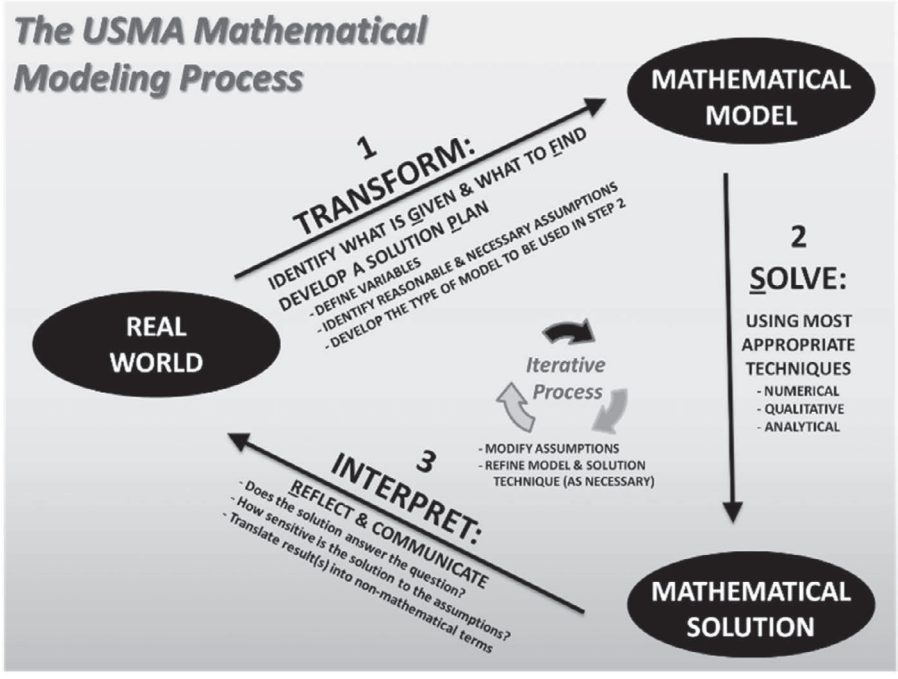

Figure 27.1 The USMA Mathematical Modeling Process.

at first, we use it as an introduction to DLAs because it is an understandable situation unlikely to inherently invoke a mathematical response, and it provides substantial room for student creativity. Additionally, while the situation is relatable, the exact context is generally not. Consequently, it enables students to do some research on their own to prepare for the DLA.

The read ahead

The first component is the *read ahead*, which is distributed to students one or two days in advance of the in-class portion of the DLA. The purpose of the read ahead is to provide a "real-world" context, a primer for any new content included in the DLA and to introduce any new technology that may be helpful to students. The expectation of students for the read ahead component is that they take the time to make connections between course material and the information provided on the read ahead in preparation for the DLA.

Example

> You are hungry. . . . At the far corner of La Grand-Place, you notice people coming in with chocolate and whipped cream smeared on their faces and fingers, eating waffles with piles of fruit, whipped cream, and chocolate sauce. . . . You notice many places nearby advertising waffles. . . . Peering in one window you see customers crowded around a small counter ordering freshly made waffles to go.
>
> Ordering Belgian Waffles is complicated. There are many choices ranging from simple waffles with just sugar for €1, to waffles with chocolate sauce, fruit, and whipped cream for €4.50 or more. Some people know exactly what they want, and others have a hard time making up their minds.
>
> If you want a waffle, how do you decide which line to join? Could you create a mathematical model? As you think about these questions, consider the steps of the USMA Mathematical Modeling Process.

In this read ahead, we introduce our students to a familiar situation within an unfamiliar context and ask them leading questions to help them link the situation to course material.

The individual component

The second component is the *individual component*. This is the first component of the in-class portion of the DLA. During the individual component, students work individually to answer computational questions that evaluate the body of knowledge necessary for further work. This sets the foundation for the team to approach a more difficult application.

Example

> [One] important [criterion] in your decision on which line to join is wait time. Using wait time as the criterion that we want to measure; the next modeling step is identifying independent variables that influence the wait time. In this case, we want to distinguish between two different types of independent variables – those that are easily observed and those that are more difficult to observe.

1 Describe one easily observed independent variable that might help determine wait time. How would you expect this variable in isolation to influence wait time?
2 Describe one independent variable that is more difficult to observe and that might help determine wait time. How would you expect this variable in isolation to influence wait time?

At this point in the course we have discussed the importance of defining variables. Students have practiced reading word problems and defining the variables in them, so this portion should be straightforward. Here, we expect them to begin to think about how these independent variables, such as number of people in the line (easily observed), influence wait time (make it longer).

The team component

The third component is the *team component*. During the team component, students work collaboratively to solve challenging application problems. These problems require a deeper level of understanding than what might be expected of an individual student in a time-constrained assessment environment. Typically, team components build on the individual component of the assessment.

Example

3 Develop a mathematical model whose goal is to predict how long you will have to wait for a waffle based on at least two independent variables. Include all the elements of the TRANSFORM step of the USMA Mathematical Modeling Process.

   a Define your variables. Remember to include a description of what the letter represents and the appropriate units.
   b List your assumptions. Remember to include a description of why they are both reasonable AND necessary.
   c State your model. Your model should be an equation that determines wait time as a function of at least two variables.

Although at this point in the course we have covered some basic mathematical models, the students will not have any experience with creating a model representing a problem in an unfamiliar context. We ask them to use the elements from the individual component (defining variables) to help solve a problem that will stretch their capabilities.

The individual reflection component

The fourth component is the *individual reflection component*. This is the final in-class portion of the DLA. During the individual reflection component, students are asked to individually reflect on the results from their team's efforts by answering a conceptual question that is designed to synthesize the knowledge gained throughout the experience.

Example

4 Explain why an assumption must be both reasonable and necessary.

To answer this question, think about:

- What it means for an assumption to be reasonable.
- What it means for an assumption to be necessary.
- How these two concepts are different.
- Why both are needed for the assumption to be valid.

This component is designed to give students the opportunity to make connections between the knowledge they brought to the DLA and the team component they just completed. In this case we focused on assumptions (something previously covered) and how they relate to a model (something learned in the DLA).

Instructor feedback

The fifth and final component of the DLA experience is *instructor feedback*. Here, instructors provide students with detailed feedback on both their individual and team performances. This includes highlighting missing or incomplete components or asking questions for the students to consider. Most importantly, the feedback should encourage creativity and provide insights on how to improve. While instructor feedback varies in nature depending on the content of the DLA, the feedback is generally holistic in nature. Additionally, the feedback is delivered promptly after the DLA. This allows instructors to provide feedback on the DLA verbally to their class and to use the DLA as the basis of some of their future lessons focused on the material that the DLA was pushing students to begin exploring.

Literature review and intellectual merit

The underlying learning theory for DLAs is a blend of discovery learning theory and team-based learning. These learning theories are the lenses through which we look as we approach the idea of making assessments a learning opportunity. Additionally, understanding the nature of assessment enables us to implement the learning theories in practice.

Discovery learning

The goal of education according to Discovery Learning Theory is to have "students interact with their environment . . . and derive information for themselves."[2] Therefore, educators who are discovery learning theorists work to enable the learner to make connections between "his existing schemata and the new phenomena" so that he can "remake or extend [his] schemata to accommodate new facts and events."[3] These ideas

2 Jeanne Ormrod, *Educational psychology: Developing learners* (Upper Saddle River, NJ: Pearson Merrill Prentice Hall, 2006), 451.

3 Hilda Taba, "Learning by discovery: Psychological and educational rationale," *The Elementary School Journal* 63, no. 6 (March 1963): 308–316.

have been around for over a century, but they were not formalized until the 1960s, when Jerome Bruner gave a name to this constructivist learning theory. Dewey's ideas that each student's unique life experiences must be taken into consideration in the classroom[4,5] and Piaget's basic assumption in his theory of cognitive development that "interaction with one's physical and social environments is essential for cognitive development" provide a foundation for Discovery Learning Theory.[6]

Discovery learning has been found to be particularly effective in developing students' higher-order thinking skills of Anderson and Krathwohl's revision of Bloom's Taxonomy.[7,8] Consequently, Taba claims that an individual who has learned through discovery "is better equipped to move into unknown areas, to gather data, and to abstract from these ideas and concepts."[9] This concept supports the true nature of our problem-solving-based course and encourages the continued use of discovery learning in our classrooms.

Team-based learning

A growing sub-movement of the flipped classroom movement in higher education is team-based learning (TBL). A considerable amount of research has been carried out into a range of aspects of TBL over the last 30 years. The Team-Based Learning Collaborative maintains a list of publications related to team-based learning. These papers focus on TBL techniques applied to classroom instruction and compare its effectiveness with more traditional lecture techniques.[10,11,12] Hamm and Adams state that "peer support helps students feel more confident and willing to make mistakes that go hand in hand with serious inquiry," and "student learning teams are a powerful way to approach mathematics instruction."[13] This result reflects our own experiences as educators; consequently, we believe in the power of the combination of the individual and the team components of DLAs.

Assessment

Assessment has always been an integral part of teaching. Often, assessment drives teaching. Boud and Falchikov go as far as to say, "Assessment, rather than teaching, has a major influence on students' learning. It directs attention to what is important. It acts as an incentive for study. And it has a powerful effect on what students do and how they do

4 John Dewey, *Democracy and education: An introduction to the philosophy of education* (New York: The Macmillan Company, 1923).
5 John Dewey, *Experience and education* (New York: Collier, 1938).
6 Ormrod, *Developing learners*, 26.
7 Lorin Anderson et al., "A taxonomy for learning, teaching, and assessing: A revision of Bloom's taxonomy of educational objectives," *Educational Horizons* 83, no. 3 (2001): 154–159.
8 Ormrod, *Developing learners*, 451–453.
9 Taba, "Learning by discovery," 308–316.
10 Rita Rezaee and Neda Moadeb, "Team-based learning: A new approach toward improving education," *Acta Medica Iranica* 54, no. 10 (October 2016): 678–682.
11 Christopher Huggins and Janet Stamatel, "An exploratory study comparing the effectiveness of lecturing versus team-based learning." *Teaching Sociology* 43, no. 3 (July 2015): 227–235.
12 Rachel Stein, Corey Colyer, and Jason Manning, "Student Accountability in team-based learning classes," *Teaching Sociology* 44, no. 1 (January 2016): 28–38.
13 Mary Hamm and Dennis Adams, *Activating assessment for all students: Innovative activities, lesson plans, and informative assessment* (New York: Rowman & Littlefield, 2009), 86.

it."[14] In the last few decades, much work has been done to illustrate the shortcomings of the traditional notion of assessment. In the 2001 National Research Council document, "Knowing What Students Know: The Science and Design of Educational Assessment," an emphasis is placed on broadening the conception of "assessment." Specifically, they state, "Assessments must tap a broader range of competencies than in the past. They must capture the more complex skills and deeper content knowledge reflected in new expectations for learning."[15] Our notion of assessment for learning is also not a novel concept. Stiggins states as one of his guiding principles for effective assessment practices that assessments should both promote and verify learning.[16]

Similarly, much work has been done on the benefits of authentic assessment, which is one of the aims of our DLAs. Our assessments are designed based on the authentic assessment principles. Wormeli defines authentic assessment as having two key facets: first, the assessments should be similar to how the student will apply their content knowledge in real-world applications; and second, the assessments should be authentic to the ways in which the students are learning the material.[17]

Mazur claims that the current traditional method of assessment is outdated.[18] He asserts that we can create assessments in such a way as to encourage the higher-order thinking skills (creating, evaluating, and analyzing) of Anderson and Krathwohl's (2001) revision of Bloom's Taxonomy rather than the traditional assessment that primarily rewards remembering, understanding, and applying.[19] He introduces the idea of part of an assessment being a collaborative experience where students can exchange ideas and learn from one another. While Mazur clearly has strong opinions and an abundance of ideas about this topic, we are unaware of any research studies that have addressed the feasibility and effectiveness of such assessments.

Initial implementation of discovery learning assessments

We conducted a mixed methods study of a large-scale pilot project in Mathematical Modeling and Introduction to Calculus during the fall 2017 semester as a proof of concept. The course is taken by approximately 900 first-semester students at USMA in sections of 16–18 students. The purpose of the course is to enhance the ability of each cadet to solve real-world problems using the mathematical tools of discrete dynamical systems and continuous functions.

Nine out of the 54 sections were selected for the pilot. The students enrolled were randomly assigned to the sections by the registrar. Eight experienced instructors taught the pilot sections, with six of those instructors also teaching traditional sections of the course during the same semester to reduce variability when comparing results of the two styles of assessment.

14 David Boud and Nancy Falchikov eds., *Rethinking assessment in higher education: Learning for the longer term* (New York: Routledge, 2007), 4.

15 James Pellegrino, Naomi Chudowsky, and Robert Glaser eds., *Knowing what students know: The science and design of educational assessment* (Washington, DC: National Academy Press, 2001), 22.

16 Rick Stiggins, *The perfect assessment system* (Alexandria VA: ASCD, 2017), 9.

17 Rick Wormeli, "Accountability: Teaching through assessment and feedback, not grading," *American Secondary Education* 34, no. 3 (Summer 2006): 14–27.

18 Mazur, *Assessment*.

19 Anderson et al., "Taxonomy for learning," 154–159.

In the traditional assessment sections, students took four course-wide midterm exams throughout the semester and a cumulative final exam to gauge their level of understanding in addition to weekly quizzes at the discretion of their instructor. Meanwhile, the pilot sections replaced midterm exams and quizzes with twelve DLAs. Additionally, the final exam was replaced with a lower stakes post-assessment. The DLAs were given almost weekly compared to the traditional midterms, which were administered approximately monthly.

Our pilot was the first implementation of DLAs (or anything like them) in an undergraduate mathematics classroom. Consequently, our ideas about DLAs have been constantly evolving since the beginning of the pilot semester. One of the most notable evolutions occurred just six weeks into the pilot semester. At that time, the structure of DLAs was expanded from three to five components. The first DLAs consisted of a night-before read ahead, an in-class individual component, and an in-class team component. The read ahead presented a scenario with little mention of current course material. The individual component then asked questions related to the scenario which were more conceptual in nature. After spending time on the individual component, the students were randomly assigned to teams of four to answer the same questions as a team. For example, the original version of the "Belgian Waffles" DLA asked the team the same two questions as the individual, with one additional extension question. The idea was for them to discuss what they had each said individually and to build from those responses to come up with a better team response than any of them had submitted individually. Soon after the assessment, we provided the students with feedback.

Data and results

Every semester, we collect data on students' grades on all assignments. Additionally, students take a survey before and after the course in which they answer questions concerning their attitudes and beliefs toward aspects of mathematics and key principles in the course. The attitudes and beliefs surveyed are a subset of the Mathematics Attitudes and Perceptions Survey (MAPS). These aspects, coupled with a pretest on foundational knowledge and subsequent calculus course performance, provide quantitative data for us to analyze. Qualitatively, the pilot instructors met at least once a week to share and discuss their observations of both the assessments and their classroom environment in an informal focus group environment.

Qualitative observations

After several of the DLAs, it became apparent that many of the groups were simply reading all the individual responses and copying whichever one they decided was best as their team response rather than trying to combine their thoughts and efforts to create an even better response. In an attempt to change this behavior, we began changing the team questions slightly so that they would build from the individual questions.

Initially, every student had a copy of the team component, and we observed some people initially working in isolation on the team challenge. The number of copies of the team assessment that were given to teams decreased gradually until each team received one copy of the team questions. After this change, instructors saw a marked increase in

the amount of interaction and meaningful conversation teams were having about the questions.

The interactions our students were having with one another about math extended beyond the assessment days and into our classrooms on other days. We no longer felt like we were playing the part of "oracle" in our classrooms. Our students were more likely to ask the student next to them a question than they were to ask us a question in class. Through working together on assessments as teams, they learned one another's strengths and weaknesses and started approaching all of the course material as a team.

As instructors, our most concerning observation was that it seemed the pilot-section students were not progressing in their computational ability at the same rate as their peers in the traditional assessment sections. However, after analyzing a computational pre- and posttest that all students in the pilot and traditional sections took, we found no statistical support for this subjective observation.

Quantitative results

After objectively evaluating the impacts of DLAs on student performance, no statistically significant differences were detected within the course. However, when a fixed-effects linear regression model was employed to compare student performance in the subsequent course, Calculus I, statistically significant results were detected. Across the full population analyzed, the DLAs did not hinder any subgroup's performance in Calculus I. Additionally, when limiting the population to students that did not have calculus prior to attending USMA, the resulting model showed that students from the treatment group statistically significantly outperformed students from the control group (see Figure 27.2). Consequently, we hypothesize that this approach to assessment has the potential to improve equity in the college mathematics classroom.

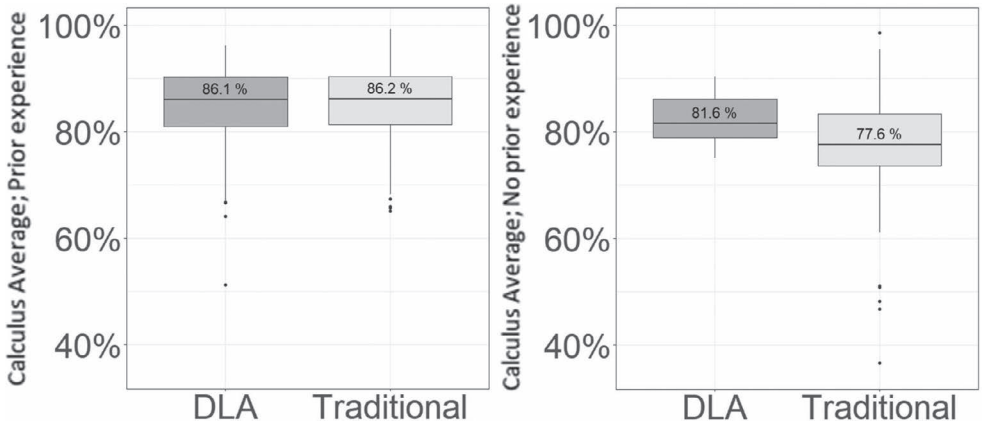

Figure 27.2 Spring 2018 single variable calculus course averages for students who took Mathematical Modeling and Introduction to Calculus during the fall 2017 semester. The graph on the left is those with prior calculus experience, while the graph on the right is those without prior calculus experience.

From pilot to implementation

In response to these primarily positive results, we worked to improve DLAs by incorporating the best aspects of traditional assessments while maintaining the positive aspects of DLAs. As a result, DLAs have changed from our initial implementation to our current implementation. In the fall 2018 semester, we implemented the latest version of DLAs into the full course. The four biggest changes from the pilot semester to present were the approach to teams, the individual versus team content, the introduction of measures to increase baseline student participation, and the way we approach grading DLAs.

Groups become teams

To capitalize on the benefits gained from having students work as parts of teams, we maintained the same teams for each approximately six-week unit of material. These teams sat together in pods of desks in our classrooms and knew that they would be working with one another for each team part of an assessment during that unit. By assigning students to teams for the unit we were giving students the chance to hold their teammates accountable for learning the material throughout the unit so that they would be useful members of the team when assessments were given. Additionally, it gave students a chance to discuss the read ahead with their assessment team prior to the in-class portion. Every unit we changed the teams to give our students the opportunity to learn to work with a different team of students. This also made sure that no students felt stuck in a dysfunctional team for the entirety of the semester.

Individual versus team content

To address instructor concerns that the students who were a part of our DLA pilot were not as computationally competent as their peers in the traditional sections – despite the quantitative results indicating otherwise – we redesigned the individual and team components of DLAs. In the redesign, the individual component of the DLA became more computational in nature. The purpose of the individual component became to quiz each student's individual knowledge of the material that had been covered in the course so far in preparation for contribution to the team component of the assessment. This allowed us to directly assess individual computational skills. Additionally, we included a single question on the individual component that acted as a bridge to the team component.

The team component remained a challenging stretch of the material beyond what we had done in the course so far. The stretch may be a push forward in the course material, a connection to a topic that is beyond the course material, or a new application of the material. With these stretches, we can meaningfully replace material coverage days with DLAs.

Encouraging participation from reluctant students

While there were changes to the individual and team components, perhaps the biggest change in the structure of DLAs was the addition of an individual reflection component, forcing students to synthesize the experience. This component is usually very brief and asks students a conceptual question that is generally easy to answer if they were engaged with their team throughout the team component and is nearly impossible in the time allotted if they were not engaged during the team component.

To further encourage participation from every student, we introduced peer assessments for a grade at the end of each unit after all the assessments had been completed. With these peer assessments we asked questions specifically about work ethic and team comradery, nothing about academic ability. We also decreased the percentage of a student's grade that would be team points. Two-thirds of the DLA points came from the individual portions and peer assessment to motivate students to take responsibility for their own learning.

Views on grading

Regarding course grades, in general the average points earned per student was less during the fall 2018 full-course implementation than in previous semesters; however, this was not entirely unexpected. We asked harder questions, raised the expectations for students, made them think more critically about new types of problems, and inhibited the use of pattern recognition alone to achieve top grades. Initially, we designed rubrics that subtracted points for incorrect steps or methods. However, during the full-course implementation, we realized that it would be more appropriate to build rubrics that awarded points for quality work, problem solving, and taking steps toward the correct answer, even if that was not achieved. These rubrics also allowed multiple ways to gain maximum points.

Considerations for writing a discovery learning assessment

If you share our beliefs that we should use assessment time as a time for student learning, we ask you to consider trying a DLA in your classroom.

Design the experience

When you first consider implementing or giving a DLA, focus on creating a unique, growth-based experience. The intent is to provoke students to learn or discover something valuable on their own and as teams. Thus, ill-defined problems or situations are good, else the "discovery" aspect may not be present.

When developing an experience, a focus area is useful. Some options for focus are self-teaching to introduce students to a future lesson that will be taught fully later (this can allow the instructor to set up a hook or lead-in to the next lesson), a topic tangential to the lesson, or some other focus like a new application. A good DLA could also allow students to reinforce material already learned by justifying or deriving the material in a way not previously covered in class.

The sub-assessments

Consider crafting the team component first, focusing on the discovery process, which is enhanced through team learning. Then consider how to present the scenario in the read ahead. The read ahead may include questions or problems for students to complete to prepare them for the in-class portions, or items to consider so that they can make linkages between course content and the scenario. Next consider the individual skills required for each student to participate in the problem-solving experience during the team component. These are typically more computational skills that should be included on the

individual component. The individual component may be short and only require students to "think" about a larger problem to be covered in the team component.

The intent of the individual reflection component is for students to write about their experience to solidify something of value they learned. This also serves as a check to ensure they were actively involved in the team component. It may merely consist of a reflection question about the key takeaway from the experience that requires a short answer response. If you want to focus more on ensuring engagement in the team component, the question could include using something from the team component to answer a supplemental question. If time is a constraint, this part can be done after class as homework. It is important to note that forcing reflection is hard work. Students struggle to do it, and without incentive, many of them will not do it.

Additional considerations

Once a DLA experience has been developed, some other considerations – which include timing of the sub-assessments, available references during the DLA, organizing teams, grading and scoring, and providing feedback – must be contemplated.

Timing of sub-assessments

After much experimentation, we have found that it is often preferable to assign the same amount of time to both the individual and team components, with less time allotted to the individual reflection component. Ultimately, the primary guiding factor when determining timing of the assessment should be what will provide the best learning experience.

References

During a DLA it may be useful and developmental to allow students to use hard-copy or technological resources. Hard-copy resources can range from handwritten sheets of notes to printed articles and books. The use of such resources is not uncommon in a traditional assessment environment, so allowing them during a DLA may feel natural.

However, it may be beneficial to allow students to use technological resources as well. These resources could include computational software, data visualization and analysis packages, applets, and even unrestricted access to the internet. Since DLAs strive to parallel the "real-world" working environment, allowing reasonable hard-copy and technological resources should be considered for an optimal learning experience.

Organizing teams

When organizing teams, an instructor must take two major factors into account: desired number of students on a team and composition of the members of the team. We recommend teams of three be used in most cases. Two-person teams may not provide enough experience, interpersonal tension, or varied points of view to provide a strong team-learning environment. On the other hand, four students may be too many, as one is often "left out" or can easily become a "free-loader" for this critical portion. Composition of teams is also important. Instructors should be intentional when assigning students to teams considering background, performance, and commonalities when making decisions about team makeup.

Scoring and grading

When deciding how to grade the DLA, one must consider the overall experience and the DLA's role in the broader course. Sometimes, DLAs may be used in such a way that they are only worth enough points to motivate students to participate. Other times, DLAs may be the primary assessment tool for a course. Regardless of the points assigned, grading DLAs can be difficult. If the assessment is ill-defined enough, students may provide unexpected answers that show depth of thought. Rewarding such responses is recommended. Consequently, holistic grading, as opposed to cut-sheet grading, may be preferable. All answers to a question can be binned in a grade category (e.g., A, B, etc.). This binning can be done by primarily comparing the answers from students. This process is useful since it is difficult to predict the answers students will give and to define what constitutes a "correct" response.

Feedback

Note that grading, at its lowest level, is not feedback. More important than the score on an assessment is an instructor's notes giving the student guidance, correction, and, where possible, praise. Since these assessments aim to promote creative excellence, creativity should be noticed and noted. For the DLA learning experience to be as meaningful as possible, instructors must guide students on how to improve or refine their responses.

Preparing students to take a DLA

One thing to keep in mind when implementing DLAs is that they are an entirely new type of experience for students. Several things can and should be done to help students adjust to this new style of assessment. First, there should be formal and informal no-stakes practice. This can include altering the physical classroom to encourage group discussion or giving team-based problems to accomplish in class on a regular basis. This will help the students become accustomed to teamwork and will develop team dynamics.

There should also be a formal practice DLA conducted at the beginning of the term that helps the students see and feel exactly what a DLA is, while not being assessed for points. We use our "Belgian Waffles" DLA for this purpose. Instructors should ensure they cover the structure of the DLA, explain the different portions, and perhaps even conduct a "talk through" of how the event will look and feel prior to any DLA, including the no-stakes practice DLA. Class discussions on how students should prepare that inform them of what a read ahead is and how to use it are advised. Lastly, instructors should encourage their students to study for the DLA in their teams. This will help the team work together during the DLA and encourages all members to be prepared for the assessment.

For more resources on implementation and examples of both DLAs and rubrics from our course, see the companion website for this volume.

Conclusion

DLAs are now fully implemented into Mathematical Modeling and Introduction to Calculus. The intent of DLAs remains to provoke students to learn or discover something valuable on their own or in teams. We continue to strive to improve the way we use

DLAs to offer feedback to our students on their understanding of course objectives while, more importantly, providing additional experiences for them to learn and engage in the material.

Although we continue to look for ways to improve DLAs and their course implementation, we believe that the current construct of DLAs genuinely reflects our four tenets. By evaluating beyond the base of knowledge that traditional assessments measure, we develop students' abilities to achieve higher order learning goals, including creative excellence and quality collaboration. We know that the problem-solving future for our student will include teamwork as well as access to cutting-edge technology and resources. Through DLAs we are fostering both.

Beyond our tenets, we are encouraged at the potential to improve equity in the college mathematics classroom based on our qualitative and quantitative results. Going forward, we are excited about the spread of DLAs to mathematics elective courses and beyond. We believe that DLAs are the future of classroom assessment and hope you consider joining us by trying one in your classroom.

28 Understanding positive change in academic performance

The most improved student

Paul F. Evangelista and Gess LeBlanc

Introduction

Teachers strive to inspire, build positive habits, and ultimately instill character within students that will enable increased lifelong learning and success.[1] As teachers accompany students down the path of learning development, some students inevitably progress slowly or stray from the path. Diagnosis, by both teacher and student, typically ensues. Attribution seeking after failure or success is common.[2] Oftentimes this attribution-seeking behavior creates misguided beliefs that exacerbate academic problems.[3] Teachers may become introspective, searching for ways that they can improve their teaching behavior. Teachers also play a crucial role in ensuring students attribute success and failure in an appropriate manner, exhibit productive help-seeking behavior, and ultimately follow the path of learning with the best possible chances for success. Students may become introspective, attempting to determine the cause of their performance. Students and teachers both deserve to know the traits that improve academic performance.

The research in this paper exposes these traits through analysis of related literature and narrative based interviews with 11 West Point students who personally experienced positive academic change during their four-year experience. The premise of this work is that positive academic transformation grows from change in critical student traits, and these traits consist of behaviors, beliefs, and attitudes that lead to success in college. Five critical student traits emerged from this research: psychosocial maturity; motivation; prerequisite abilities; time management and organization; and propensity for interaction and engagement. Analysis of existing literature supports the relationship between these traits and academic performance, and analysis of the interview results provides contextual detail describing the catalysts that changed these traits and how these changes affected

1 Many universities explicitly include character as part of their mission or vision, and nearly all universities implicitly include character. Thomas Lickona defines character as "knowing the good, desiring the good, and doing the good" (Lickona, 1992, p 51). Character centers on both the knowledge and ability to do what you ought to do. Every university embraces the knowledge component of this definition, and it is easily argued that nearly every university implicitly or explicitly reinforces the latter component.

2 Bernard Weiner, "An Attributional Theory of Achievement Motivation and Emotion," *Psychological Review* 92, no. 4 (1985): 548–573.

3 Lisa S. Blackwell, Kali H. Trzesniewski, and Carol Sorich Dweck, "Implicit Theories of Intelligence Predict Achievement Across an Adolescent Transition: A Longitudinal Study and an Intervention," *Child Development* 78, no. 1 (2007): 246–263; Raymond P. Perry, Frank J. Hechter, Verena H. Menec, and Leah E. Weinberg, "Enhancing Achievement Motivation and Performance in College Students: An Attributional Retraining Perspective," *Research in Higher Education* 34, no. 6 (1993): 687–723.

academic performance. The present research focuses on the traits that emerged as forces of academic performance change for the 11 students interviewed.

Based on a review of literature, there appears to be a strong likelihood that these traits also extend to non-West Point undergraduate experiences as well. It is acknowledged that the academic experience at West Point is different from the typical college academic experience. Every effort has been made to generalize this discussion and consider the West Point student academic education in the same broad category as other undergraduate academic education experiences. The military environment and culture of West Point undoubtedly differs from a typical college. However, the curriculum and academic requirements of West Point students remains similar to many American universities. The curriculum at West Point consists of eight semesters, each including five or six courses. Most students carry between 16 and 20 credit hours per semester. The overall academic program provides "a broad liberal education designed to develop versatile, creative, and critical thinkers will help our graduates anticipate and respond effectively to the uncertainties of a changing technological, social, political, and economic world."[4] Each student receives a relatively similar curriculum during the first two years consisting of courses in basic sciences, technology, mathematics, humanities, and social sciences. Cadets choose a major that significantly influences course work during their latter two years at West Point, but elements of the core curriculum remain persistent throughout to ensure that a broad liberal education is received by all. Cadets experience extracurricular demands throughout the academic semesters; however, there is a clear emphasis that academics remain a priority from August through May.

The philosophy behind the research methodology also deserves a brief explanation. Based on their demonstration of significant positive change in academic performance, 11 West Point seniors were selected and interviewed to discuss their experiences and ideas regarding positive academic transformation. A sample size of 11 is small. However, there are benefits to small sample size qualitative studies. Crouch and McKenzie discuss the importance of using small sample qualitative interviews in order to develop "detailed context," "in-depth inquiry," and "dynamic qualities."[5] Personal, narrative-based interviews provide context and in-depth understanding that is not achievable through large-scale, highly structured questionnaires or interviews.

In addition to the benefits of small-scale qualitative responses, this research also benefits from exploratory analysis rather than traditional confirmatory analysis, which seems to inundate higher education research. John W. Tukey coined the phrase "exploratory data analysis" (EDA), and his seminal work on the topic in 1977 starts by explaining that EDA differs from "confirmatory data analysis" because it attempts to learn from data and seeks the unexpected.[6] He explained EDA as an endeavor to explore "data and what it seems to say."[7] It is an effort to generate hypotheses, a method to inform intuition, and a structured technique to uncover nuances that are often unobserved or misinterpreted. The present work used simple quantitative EDA techniques to identify interview candidates; however, the conduct and analysis of the interviews was entirely

4 United States Military Academy, *Academic Program Strategic Plan, 2013–2018* (West Point, NY: United States Military Academy, 2013).

5 Mira Crouch and Heather McKenzie, "The Logic of Small Samples in Interview-Based Qualitative Research," *Social Science Information* 45, no. 4 (2006): 483–499.

6 John W. Tukey, *Exploratory Data Analysis* (Reading, MA: Addison-Wesley, 1977), 3.

7 Ibid., ii.

qualitative and narrative based. Uncovering the trait changes that create positive change in college students is a broad research endeavor. It is interesting that Tukey, a statistician and quantitative-oriented scientist, and Crouch and McKenzie, both qualitative-oriented sociologists, all believe that exploratory analysis is the best technique for broad questions. Tukey's research focuses on the quantitative methods necessary to identify insights from existing data. Crouch and McKenzie describe the qualitative techniques to extract insight from interviews. Both techniques are applied in this work.

Related work

Ernest L. Boyer wrote a highly regarded book that discusses the college experience, and he started with the following statement: "The undergraduate college in America, with its long and venerable tradition, has a unique mission to fulfill, one that will enrich and, at its best, transform."[8] Boyer identifies eight concerns that he believes are the primary sources for friction on college campuses, many of which inhibit positive transformation. These eight items include the

> transition from school to college, the goals and curriculum of education, the priorities of the faculty, the condition of teaching and learning, the quality of campus life, the governing of college, assessing the outcome, and the connection between campus and the world.[9]

He includes an entire chapter devoted to "the written and the spoken word," or language.[10] Boyer asserts that language is the most essential prerequisite for college, and lack of preparation in reading and writing will continue to inhibit "educational, social, and vocational options."[11] Another comprehensive volume with much relevancy to student transformation is a book written by Pascarella and Terenzini. *How College Affects Students* is a synthesis of research, reviewing approximately 3,000 studies that have examined the impact of college on students.[12] The book includes a discussion of research on personal change, learning and cognitive development, major theoretical models of college student change, the socioeconomic impact of college, and long-term quality-of-life impact.

Much research also exists on theories of performance attribution, research that seeks to uncover the behaviors and beliefs that students attribute to academic performance. Perry, Hechter, Menec, and Weinberg discuss attributional retraining methods developed for college students.[13] The logic of Perry et al. for attributional retraining is that "if students could be inoculated against negative attributions for academic difficulties in their first year, then according to Weiner's theory it would produce an increased expectancy of success, and increased motivation and mastery strivings."[14] Given the fact that nearly all college students are struggling with the emotional adjustment of losing their childhood,

8 Ernest L. Boyer, *College: The Undergraduate Experience in America* (New York: Harper and Row, 1987), 1.
9 Ibid., 6.
10 Ibid., 73.
11 Ibid., 73.
12 Ernest T. Pascarella and Patrick T. Terenzini, *How College Affects Students* (San Francisco: Jossey-Bass Publishers, 1991).
13 Perry et al.
14 Ibid., 693.

gaining independence and responsibility, and navigating an entirely new social and living environment, the risk for increased anxiety, depression, and altogether negative emotions is certainly high during the transition to college.[15] This is particularly the case for students that initially face struggles and may not be prepared for the rigors of college academics. Compas et al. stress the vulnerability of students facing this transition as well as the importance of programs designed to help students navigate the transition.[16] Eccles, Lord, and Midgley discuss the impact of the performance attribution models of the teachers.[17] Unsurprisingly, teachers who believe that students possess fixed intelligence and limited growth opportunities, described as low teacher self-efficacy, have students that underperform when compared to teachers with high self-efficacy.

It is widely accepted that teaching behavior has a significant impact on student learning, and the body of research on teacher behavior and practices is extensive. Pascarella and Terenzini synthesize much of this research, discussing the impact of teacher clarity and student–faculty informal interaction.[18] Student involvement also receives attention in the literature, with studies that focus on peer teaching, the extent and quality of student effort, and student interactions with faculty.[19] Within the bodies of research that involve teaching behavior and student behavior, two significant themes emerge. Learning is complex and dynamic, and placing importance upon one facet of learning would be shortsighted. However, the literature undoubtedly promotes some favored behaviors, both for the student and the faculty. Teacher clarity, a function of subject matter command and organization, consistently ranks high amongst favored teacher behaviors. For the student, involvement and engagement, through a number of modes of communication and with various people, consistently ranks high as an important student learning behavior.

A wide body of research has identified several predictive factors associated with college retention, a common measure for student success. These include cognitive factors such as student grade point average (GPA) and standardized test scores; noncognitive factors include level of persistence to degree completion, level of academic self-confidence and motivation, academic skills (e.g., time management skills, study skills, and study habits), and level of academic and social integration in schools.[20]

15 Bruce E. Compas, Barry M. Wagner, Lesley A. Slavin, and Kathryn Vannatta, "A Prospective Study of Life Events, Social Support, and Psychological Symptomology During the Transition From High School to College," *American Journal of Community Psychology* 14, no. 3 (1986): 241–257.

16 Ibid.

17 Jacquelynne S. Eccles, Sarah Lord, and Carol Midgley, "What Are We Doing to Early Adolescents? The Impact of Educational Contexts on Early Adolescents," *American Journal of Education* 99, no. 4 (1991): 521–542.

18 Pascarella and Terenzini.

19 Ibid.

20 John M. Braxton, *Reworking the Student Departure Puzzle* (Nashville: Vanderbilt University Press, 2000); John M. Braxton and Shederick A. McClendon, "The Fostering of Student Integration and Retention Through Institutional Practice," *Journal of College Student Retention: Research, Theory & Practice* 3, no. 1 (2002): 57–71; Dennis Kelly, Michael D. Matthews, and Paul Bartone, "Grit and Hardiness as Predictors of Performance Among West Point Cadets," *Military Psychology* 26, no. 4 (2014): 327–342, DOI: 10.1037/mil0000050; Peter W. Kennedy, Barry G. Sheckley, and Marijke T. Kehrhahn, "The Dynamic Nature of Student Persistence: Influence of Interactions Between Student Attachment, Academic Adaptation, and Social Adaptation," presented at the *Annual Meeting of the Association for Institutional Research* (Cincinnati, OH, 2000); William D. Mangold, LuAnn G. Bean, Douglas J. Adams, William A. Schwab, and Scott M. Lynch, "Who Goes Who Stays: An Assessment of the Effect of a Freshman Mentoring and Unit Registration Program on College Persistence," *Journal of College Student Retention: Research, Theory & Practice* 4, no. 2 (2003): 95–122; Julie P. Noble and Richard L. Sawyer, Is High School GPA Better Than Admission Test Scores for Predicting Academic Success in College?" *College and University* 79,

Recent studies demonstrate the important role of noncognitive factors in predicting academic outcomes.[21] For example, in their work examining the role of noncognitive factors, Farrington et al. identified five general categories of noncognitive factors that are related to academic performance: academic behaviors, academic perseverance, academic mindsets, learning strategies, and social skills.[22] In their comprehensive review, they found that while studies indicate that each category impacts school performance directly or indirectly, their effects are mediated by a wide array of variables specific to the school and classroom context. Further, they note the following:

> (H)ow supports are made available and to whom, grading structures and policies, available course tracks, the ways students are assigned to those tracks, the nature of the academic tasks students are asked to do, the relationships among student peers and their orientation toward academic work, the level of safety one experiences in school, and the availability of adequate resources for learning are all important parts of any school and classroom context. Some of these variables – e.g., grading structures, feedback, and norms of behavior – are quite proximal to students' course performance and have been shown to affect academic mindsets, academic behaviors, and/or academic performance.[23]

As such, the influence of the school and classroom contexts on the demonstration of noncognitive factors is mediated by specific features of each context.

Research exploring the relationships between noncognitive factors and college performance remains an open area with little empirical investigation.[24] Farrington et al. stress that theoretical ideas clearly support the relationship between noncognitive factors and performance in college. However, these factors remain difficult to measure and do not align well with conventional assessment methods. Farrington et. al emphasize that disparity of students across different colleges and disparity in college environments further confound our ability to understand how these factors influence performance.

Duckworth, Kelly, Matthews, and Peterson describe the role of grit in the attainment of long-term goals.[25] Their study specifically measured the impact of grit on the success

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no. 4 (2004): 17–22; Colleen O'Brien and Jessica Shedd, *Getting through College: Voices of Low-Income and Minority Students in New England* (Washington, DC: The Institute for Higher Education Policy, 2001); Jennifer E. Timer and Marion Clauson, "The Use of Selective Admissions Tools to Predict Students' Success in An Advanced Standing Baccalaureate Nursing Program," *Nurse Education Today* 31, no. 6 (2011): 601–606, DOI: 10.1016/j.nedt.2010.10.015; Susan C. Wyckoff, "Retention Theories in Higher Education: Implications for Institutional Practice," *Recruitment and Retention in Higher Education* 12, no. 2 (1998): 2–7.

21 Camille A. Farrington, Melissa Roderick, Elaine Allensworth, Jenny Nagaoka, Tasha Seneca Keyes, David W. Johnson, and Nicole O. Beechum, *Teaching Adolescents to Become Learners: The Role of Noncognitive Factors in Shaping School Performance – A Critical Literature Review*, Consortium on Chicago School Research, 1313 East 60th Street, Chicago, IL 60637 (2012); Matt McGue and Irving I. Gottesman, "Classical and Molecular Genetic Research on General Cognitive Ability," *The Genetics of Intelligence: Ethics and the Conduct of Trustworthy Research* 45, no. S1 (2015): S25–S31, DOI: 10.1002/hast.495; Catalina Mourges, Mei Tan, Sascha Hein, Julian G. Elliott, and Elena L. Grigorenko, Using Creativity to Predict Future Academic Performance: An Application of Aurora's Five Subtests for Creativity, *Learning and Individual Differences* 51 (2016): 378–386, DOI: 10.1016/j.lindif.2016.02.001.

22 Farrington et al., 8.

23 Ibid., 12.

24 Ibid., 71.

25 Angela L. Duckworth, Dennis R. Kelly, Michael D. Matthews, and Christopher Peterson, "Grit: Perseverance and Passion for Long-Term Goals," *Journal of Personality and Social Psychology* 92, no. 6 (2007): 1087–1101.

of student attrition during cadet basic training at West Point. The study of grit relates to the psychosocial maturity theories of Steinberg and Cauffman that are discussed throughout this paper.[26] Grit certainly parallels the dimension of perspective as described by Steinberg and Cauffman.

Some of the most relevant related work describes various conceptual models for student development. Astin's theory of student involvement states that growth and development is a function of "physical and psychological energy that a student devotes to the academic experience."[27] Pascarella and Terenzini describe a basic causal model that includes structural/organizational characteristics of institutions, student background/precollege traits, interactions with agents of socialization, the institutional environment, and the quality of student effort, all of which eventually contribute to learning and cognitive development.[28]

The inequities of college transition

Students transitioning to college inherently start on unequal ground, and institutions of higher education have very little control over this initial inequity. Universities can only seek to mitigate and acknowledge these inequities, and ultimately strive to level inequities that create significant barriers to learning. Universities attempt to create paths to success through curriculum and student activities; these paths are designed to nurture positive development and change through a series of structured and somewhat predictable experiences. Independent learning, complex problem solving, and critical thinking are skills that nearly all institutions hope to grow and foster within their student body. Unfortunately, student growth in these skills and embracement of needed experiences cannot progress in a consistent or equal manner due to inequities in preparation.

Students entering college are not commonly prepared academically. In Amanda Ripley's book titled *The Smartest Kids in the World*, Ripley explains that the inconsistencies that exist in American education, both in terms of content and rigor, ultimately translate to significant gaps in college preparation.[29] In addition to inequities in preparation, the variance in development of the human body, physically and cognitively, among adults from ages 18–22 creates unfair conditions. Jeffrey Arnett has extensively studied "emerging adults," a period of life that he defines as late teens through early twenties. Arnett describes emerging adults as having more volition than any other time in their life.[30] This volition creates tremendous opportunity for experience and exploration, again creating significant variance in learning and knowledge amongst people of this age group. College age students experience tremendous environmental change during their initial transition. Most college students have been recently removed from the shelter of family, familiar surroundings, and protected childhood.[31] However, the nature of this removed shelter and upbringing varies from student to student, again creating inconsistencies in experience

26 Laurence Steinberg and Elizabeth Cauffman, "Maturity of Judgment in Adolescence: Psychosocial Factors in Adolescent Decision Making," *Law and Human Behavior* 60, no. 6 (1996): 249–272.

27 Alexander W. Astin (1984), "Student Involvement: A Developmental Theory for Higher Education," *Journal of College Student Personnel* 40, no. 5 (1999): 518.

28 Pascarella and Terenzini.

29 Amanda Ripley, *The Smartest Kids in the World* (New York: Simon and Schuster Paperbacks, 2013).

30 Jeffrey Jensen Arnett, Emerging Adulthood: A Theory of Development from the Late Teens Through the Twenties, *American Psychologist* 55, no. 5 (2000): 469–480.

31 Compas et al.

that translate into inconsistent problem-solving experiences, coping mechanisms, and socialization.

Lack of development and lack of preparation for college commonly manifests as poor grades. The focus of the work in this chapter is to describe how students cope with and overcome lack of development and lack of preparedness. The primary measurement of performance in this paper is the student term grade point average, an aggregation of grades received for a semester of work. It is assumed that these grades reflect learning and the positive growth and development that colleges seek.

Methodology

Analysis of the grade point average (GPA) of every student in the class of 2015 revealed students within the class that experienced significant positive change in their academic performance over the course of their first six semesters at West Point. For every student in the class of 2015, the regression slope of their term GPA over the course of their first six academic terms (semesters) at West Point, freshman through junior years, was calculated. The term GPA is not cumulative – it summarizes the grades achieved during only the semester indicated. The term GPA slope served as the indication of change in academic performance. Figure 28.1 displays this data for 11 students selected for interviews in this study. Each point on the graph for a given student represents a term GPA in chronological order, and the connecting lines show positive or negative change between terms. At the time this study was conducted, these students were in the first semester of their senior year and thus had six term GPAs in their records.

The term GPA includes possible confounding factors. Most of the courses taken during the first two years at West Point are part of the core curriculum, meaning that every student takes the same courses. During the junior year, students begin taking courses within their major. The students that participated in this study were not in the same major, introducing the possibility that inequities in grading or rigor could have influenced the selection of these students. To partially control for these factors, the difference

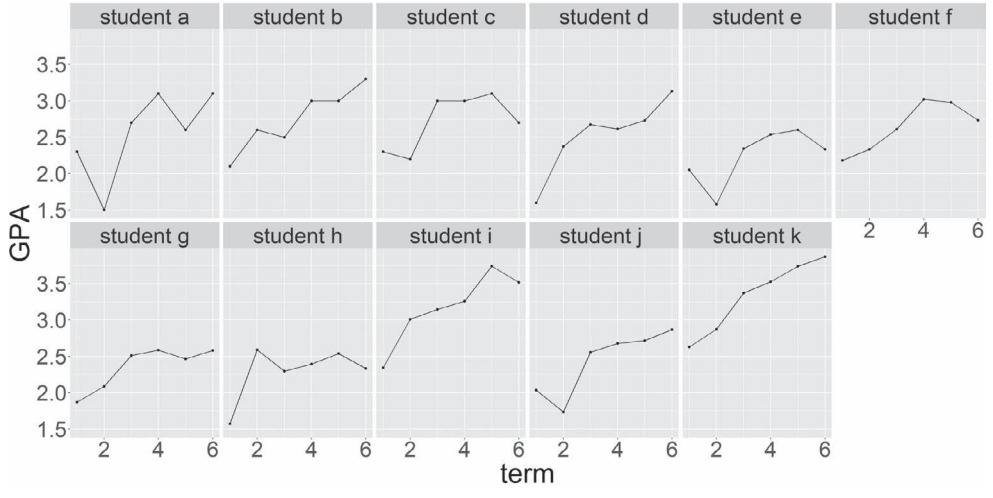

Figure 28.1 Term (semester) GPA of the 11 interviewed students.

between sophomore year term GPAs and freshman year term GPAs was also analyzed. Based on the analysis of the term GPA slope for the first six semesters and the term GPA difference between sophomore and freshman years, students were identified as having experienced significant change in academic performance based upon both measures. A sample of 11 was selected to support personal, narrative-based interviews capable of deep inquiry.[32] The 11 students selected ranked the highest when considering freshman to sophomore term GPA difference and the term GPA slope.

At the outset of this research, there were several suspected sources of academic performance change. The questions asked during interviews reflected these suspected sources, and students were encouraged to reflect and elaborate on their experiences, thus enabling exploration of other possible sources of change that were not suspected. The suspected sources included instructors, classmates, learned behaviors, and orientation of mindset. Orientation of mindset explored whether the subject demonstrated a fixed mindset or a growth mindset. Carol Dweck pioneered much of the research involving fixed versus growth mindsets.[33] Fixed versus growth mindset theory also relates to theories involving the impact of attributional tendencies. The study of attributional tendencies seeks to understand how a person derives causality for personal achievement and outcomes in life. Weiner, Perry et. al., and Aronson, Fried, and Good all discuss the impact of attributional tendencies on motivation, emotion, and performance.[34]

Each student responded to the following questions:

1 Do you realize that your academic performance has undergone very significant positive change when compared to all of your classmates?
2 Why do you think this change occurred?
3 How would you describe your academic behavior, beliefs, and performance as a plebe?[35]
4 How would you describe your academic behavior, beliefs, and performance currently?
5 What behaviors do you think created this change?
6 Weight training is a proven technique to improve muscular strength. Do you think that there are activities or behaviors that can improve academic and intellectual strength?
7 How have your classmates influenced your academic behavior and performance?
8 How have your instructors influenced your academic behavior and performance?
9 Do you consider any particular instructor or individual to have been instrumental in your transformation? If yes, who and how?
10 Have you discovered any particular way that you learn? If yes, what is it?
11 What advice would you provide to a college freshman that is starting a curriculum similar to what you have experienced?

32 Crouch and McKenzie.

33 Carol Dweck, *Mindset: The New Psychology of Success* (New York: Ballantine, 2006); Lisa S. Blackwell, Kali H. Trzesniewski, and Caro S. Dweck, Implicit Theories of Intelligence Predict Achievement Across an Adolescent Transition: A Longitudinal Study and an Intervention, *Child Development* 78, no. 1 (2007): 246–263.

34 Weiner, 548–573; Perry et al.; Joshua Aronson, Carrie B. Fried, and Catherine Good, "Reducing the Effects of Stereotype Threat on African American College Students by Shaping Theories of Intelligence," *Journal of Experimental Psychology* 38, no. 2 (2002): 113–125.

35 Plebes are students in their first year at West Point, known as freshmen at most universities.

Five traits that enabled positive academic transformation

The interviews took place approximately two months prior to graduation. Three female and eight male students participated. Twelve students were solicited for the study; 11 students agreed to participate, and one student never replied. The students received an email invitation to participate in the study. There was no compensation provided for participation. The interviewed students demonstrated open reflection, sincerity, and critical examination of their academic experiences. This behavior is consistent with Arnett's research, where he describes emerging adults as highly reflective and introspective, possibly a result of realizing that the "self is something that changes over time."[36] Every student permitted an audio recording of the interview, and analysis of these audio interviews revealed five critical traits that emerged in nearly every interview. The length of each interview was approximately one hour. The table below lists these traits and the number of students that indicated significant personal growth in the trait.

Interview comments were recorded but not transcribed. Analysis of the interview results involved identifying and grouping all salient comments. The grouping was based on natural affinity among comments without concern for a potential theory or hypothesis. After grouping comments, it was evident that each group represented a distinct student trait. Each group was given a title, and the titles that emerged are the five traits discussed in this chapter. Parnell, Driscoll, and Henderson describe the process of using "affinity diagrams" as a method for functional decomposition of a system to identify the core functions that a system needs to perform.[37] This methodology remains similar to the constant comparative method, which is described as a process of continual comparison that generates both descriptive and explanatory categories.[38] Corbin and Strauss describe three steps in constant comparison: selective, axial, and open coding. Our analysis followed these three steps and yielded five critical traits, discussed below.[39]

Table 28.1 Five critical traits identified from the interviews

	Psychosocial Maturity	*Motivation*	*Prerequisite Abilities*	*Time Management and Organization*	*Propensity for Interaction and Engagement*
Number of students indicating improvement in this trait.	9	8	7	9	11

36 Jeffrey Jensen Arnett, "The Psychology of Emerging Adulthood: What is Known, and What Remains to be Known?" in *Emerging Adults in America: Coming of Age in the 21st Century*, ed. Jeffrey Jensen Arnett and Jennifer Lynn Tanner (Washington, DC: American Psychological Association, 2006), 307.

37 Gregory Parnell, Patrick Driscoll, and Dale Henderson (Eds.), *Decision Making in Systems Engineering and Management* (Hoboken, NJ: John Wiley and Sons, 2011).

38 Barney G. Glaser and Anselm L. Strauss, *The Discovery of Grounded Theory: Strategies for Qualitative Research* (New York: AldineTransaction, 1967).

39 Juliet Corbin and Anselm Strauss, *Basics of Qualitative Research: Techniques and Procedures for Developing Grounded Theory* (Newbury Park, CA: Sage Publications, 1990).

Psychosocial maturity

Steinberg and Cauffman describe psychosocial maturity as a combination of three psychosocial aspects: responsibility, temperance, and perspective.[40] Steinberg and Cauffman define responsibility as healthy identity, independence, and self-reliance; temperance involves impulse control, sound decision making, and considering the thoughts of others before acting; perspective involves the ability to understand complex situations holistically and within a large context, to include the concept of delayed gratification.[41] Nine students indicated some form of psychosocial maturity as lacking when they first entered West Point.

Nine of the 11 students described several psychosocial immaturity symptoms to include short-sighted behavior, hubris, and depression during their first year at West Point. One student indicated that he did not have to study in high school and felt he should not have to study at West Point. Another student commented that he graduated "magna cum laude" and "figured I was OK." Another student openly acknowledged only caring about the sport that he was recruited to play, and he would be satisfied to meet the minimum standard for all other requirements at West Point. Hubris afflicted several of the students, perhaps a function of overly lauded strong performance in high school. One student commented that he was "too immature and prideful as a plebe." Another student indicated having a bad attitude due to a sports injury and the austere conditions of freshman (plebe) year. Although not clinically diagnosed, depression appeared to affect at least five of the students. One student commented, "I was completely depressed and felt like my childhood ended. West Point was my dream, but then when I achieved it, I hated it." Struggling for self-identity is a common symptom of psychosocial immaturity, and one student stated that she openly asked herself "why am I here" throughout freshman year.

Motivation

Eight of the 11 students described lack of motivation as a hindrance to academic performance. Cadets acknowledged an underdeveloped work ethic, feelings of depression that affected motivation, and a lack of goals or a future vision. Cadets commented on not working and "avoiding academics" by spending one hour per day on academics and napping during the remaining free time. One student described having a "weird belief that you couldn't acquire new knowledge, and studying was a sign of weakness." Another student described sitting through chemistry class and surfing the internet.

Motivation was one of the traits that many students identified as a clear catalyst that created change. These catalysts included experiencing "failure and growing a fear of failure," realizing the benefits of working hard throughout the day to earn time to relax at night and learning "how to appreciate hard work." Three students described receiving critical and somewhat negative comments from specific instructors and stating that these comments motivated them to redeem themselves and "prove the instructors wrong." Cadets also credited mentorship with improving academic performance. Mentors helped students understand long-term goals, cope with setbacks, and negotiate some of the complexities of student life. One student described having a mentor

40 Steinberg and Cauffman, 249.
41 Ibid., 249–269.

who explained why the student possessed the ideal characteristics to succeed as a student and future officer. This student shared his grade on every major assignment with this same mentor, and the student described a fear of disappointing the mentor that believed in him. Other students described similar feelings of obligation with their closest instructors.

Prerequisite abilities

Initial academic performance and acknowledgment from students indicated that several students were unprepared for college studies. The students interviewed for this research generally struggled in four subject areas (the number in parentheses indicates the number of interviewed students that achieved a low grade in the subject area): chemistry (3), history (5), math (8), and English and philosophy (8). Except for students that validate courses, freshmen at West Point generally take the same classes as their peers. One student stated, "I am not as smart as them . . . others had techniques that I had not yet developed." The same student commented, "I had never written a history paper; all of my history classes before were multiple choice." Every student was a native English speaker, but lack of writing skills was a commonly acknowledged shortcoming. Boyer devotes an entire chapter to reinforce that proficiency in the English language is the first requirement and primary prerequisite for college education in America, stating, "The foundation for a successful undergraduate experience is proficiency in the written and spoken word."[42]

Time management and organization

Cadets at West Point are constantly reminded about the importance of time management. West Point offers professional counseling services to improve these skills. This is not unusual. Hoff Macan, Dipboye, Peek Phillips, and Shahani explain that many universities offer this service, recognizing that poor time management almost inevitably translates to poor performance.[43] Nine of 11 students acknowledged time management as a critical skill that improved during their time at West Point. Although scheduling and remaining disciplined to budgeted study time was a theme, the more powerful theme involved planning for major graded events. One student commented that he now has every major graded event mapped out on a calendar, and he recognizes that these events will drive his grades. He invests time according to the schedule of these major graded events. Several students also commented on the importance of starting writing requirements earlier. They recognized that their writing improved with iteration and external reviews, but these revisions take time. Common reviewers of written work included peers, academic counselors, and instructors. The students that struggled with written work universally found value in taking time to understand methods to organize thoughts, construct a paper, and practice prose.

42 Ernest L. Boyer, *College: The Undergraduate Experience in America* (New York: Harper and Row, 1987), 73.

43 Therese Hoff Macan, Comila Shahani, Robert L. Dipboye, and Amanda P. Phillips, "College Students' Time Management: Correlations with Academic Performance and Stress," *Journal of Educational Psychology* 82, no. 4 (1990): 760–768.

Propensity for interaction and engagement

Given the five traits discussed in this paper, propensity for interaction and engagement holds the most potential to improve student academic performance. Support for this assertion comes from student interviews, review of literature, and analysis of this trait. This trait also serves as a merging point for the other traits and a gateway to improved learning. For this reason, there is a bit more discussion and emphasis of this particular trait. Astin wrote a highly practical article on this topic where he defines student engagement as "the amount of physical and psychological energy that the student devotes to the academic experience."[44]

Propensity for interaction and engagement was the only trait that all 11 students universally described as critical for positive academic performance change. One student described improving cognitive engagement in class and growing a "thirst for knowledge." This same student participated in a varsity sport, and he compared this in-class engagement to a comment frequently made by his coach. The coach would state, "You have to be here at this practice, so you might as well use the time well and commit yourself to getting better." Astin describes psychological energy as a component of student involvement.[45] Teachers encourage students to take notes in class to remain engaged and document any questions or points of emphasis. Several students described reading with an "active" mind, highlighting, taking notes, and rereading when they realized they were daydreaming. Mental engagement is a conscious act that takes energy and discipline. The student that compared classroom engagement to work ethic on the practice field understood this. Disengaged students in the classroom squander valuable learning resources. Teachers also play a critical role in classroom engagement. Even the most disciplined student can struggle with monotone lectures. Many of the students described great enthusiasm for the instructors that demonstrated passion and genuine concern for student learning in class. One student stated that his physics instructor "simply loved teaching, and I loved him for that."

Barriers to interaction and engagement

Teachers greatly influence some of the barriers to both classroom engagement and engagement outside of the classroom. One student commented, "Classroom environments need to be comfortable enough to raise your hand." The same student described "approachable" versus "unapproachable teachers." "The unapproachable teacher is cold and strict, and you are more concerned about doing the right thing vice learning the material. Approachable teachers smile, are happy to be there, and are not going through the motions." Fear also played a critical role with interaction and engagement. Many students described classroom engagement as "intimidating." One student stated, "I was scared to tell the instructors that I was falling behind, and I didn't want instructors to think that I couldn't make it through West Point." The well-intentioned efforts of some academic instructors at West Point to reinforce military discipline may create barriers to learning that they do not realize. One student related, "My chemistry instructor terrified me as a freshman. We had daily uniform inspections." High standards are important at West Point, in both military duties and academics, and instructors must find ways to balance both discipline and learning. It is not possible to achieve excellence without meeting high standards; these two phrases are synonymous. However, there must be an emphasis

44 Astin, 518.
45 Ibid.

on setting and enforcing high standards while also creating a welcoming environment. Education literature often refers to this teaching model as the "warm demander."[46] Judith Kleinfeld wrote an inspiring and seminal paper that described the idea of a teacher as a "warm demander," exploring the qualities of effective teaching for Indian and Eskimo students. Her description of the warm demander model follows:

> Two central characteristics seem to distinguish effective teachers from ineffective teachers. The first and most important characteristic is the effective teacher's ability to create a climate of emotional warmth that dissipates students' fears in the classroom and fulfills their expectations of highly personalized relationships. The second characteristic is the teacher's ability to resolve his own ambivalent feelings about the legitimacy of his educational goals and express his concern for the village students, not by passive sympathy, but by demanding a high quality of academic work.[47]

Another student described lack of confidence as a barrier, stating, "I would not interact with classmates or instructors as a plebe. I didn't have the confidence." Karabenick and Knapp provide strong evidence that negative emotions such as fear, embarrassment, and low self-esteem all create barriers to healthy help-seeking behavior.[48] Teachers must realize that these emotions are inherent within struggling students, and the students' apparent behavior of disinterest or apathy could be these negative emotions in disguise. When students couple this struggle with major life transitions, such as the transition to college, they become increasingly vulnerable to a broad range of both psychological and behavioral disturbances.[49] Kleinfeld elaborates on this point while discussing teacher relationships with Native American students:

> While many teachers have come to believe that the expressionless face is a modal characteristic of Indian and Eskimo students, it is actually masking emotion. It derives from fear of loss of face if the student admits he does not understand. When rapport develops, the student does venture the puzzled frown that indicates lack of understanding.[50]

Kleinfeld emphasizes that culture is the key difference between the predominantly white teachers and the Native American students that they taught. She laments that many teachers remain culturally insensitive, failing to understand the impact of respecting and empathizing with student cultural differences. Yee echoes this same sentiment, reinforcing that first-generation college students are less likely to employ productive strategies of engagement, and in response to this, faculty often perceive this behavior as "disengaged, passive, and apathetic."[51]

46 Franita Ware, "Warm Demander Pedagogy: Culturally Responsive Teaching that Supports a Culture of Achievement for African American Students," *Urban Education* 41, no. 4 (2006): 436.

47 Judith Kleinfeld, "Effective Teachers of Eskimo and Indian Students," *The School Review* 83, no. 2 (1975): 318.

48 Stuart A. Karabenick and John R. Knapp, "Relationship of Academic Help Seeking to the Use of Learning Strategies and Other Instrumental Achievement Behavior in College Students," *Journal of Educational Psychology* 83, no. 2 (1991): 221–230.

49 Compas et al.

50 Kleinfeld, 316.

51 April Yee, "The Unwritten Rules of Engagement: Social Class Differences in Undergraduates' Academic Strategies," *The Journal of Higher Education* 87, no. 6 (2016): 853.

The educational significance of human interaction

All 11 students interviewed clearly signaled that personal interaction with people, primarily their instructor, was instrumental in their academic turnaround. Cognitive scientists have started to explain why human interaction matters in learning. John Medina is a developmental molecular biologist, research consultant, and college professor. He wrote a book titled *Brain Rules* that explains the role and functioning of the brain in school, work, and at home. He describes numerous characteristics of learning that reinforce the importance of engagement coupled with human interaction. Sensory integration is significant; learning that involves multiple sensors, and especially emotions, creates a more permanent impression.[52] With regard to memory, repetition and logical organization of information matters significantly. Several students referred to the importance of instructors "breaking down the material," and many of the students that struggled in math or sciences reinforced the significance of problem-solving repetition. Human interaction creates emotion, captures attention, and creates constant feedback and reinforcement. Medina emphasizes that all of these are key aspects to learning.

Many of the students interviewed struggled with writing, and they credited discussion and engagement with peers, mentors, and faculty as instrumental toward improvement in writing. Writing is an expression of ideas, ideally in an organized and coherent manner. Speaking is also an expression of ideas. Boyer reinforced language as the primary prerequisite for college. And he specifically stated, "Undergraduates should be able to write and speak with clarity, and to read and listen with comprehension."[53] Writing is a component of language skills; however, speaking and listening are the first language skills that any human develops. Speaking and listening are inextricably linked with writing and reading. The act of students engaging in oral discourse with instructors and stating their comprehension of a concept reflects a student's ability to write.

A significant element of writing involves formulating and organizing ideas. Effective oral discourse, especially when discussing academic concepts, requires organized and well-formulated thoughts. Students who struggle with writing commonly struggle to formulate complex thoughts in oral discourse. The students interviewed for this research realized that the best way to learn how to formulate complex thoughts was through rigorous and thoughtful oral discourse with others, especially instructors. Numerous students reinforced this point, with one stating, "If I can say it out loud, I understand it; in order to understand the material I need to talk about it with my peers and talk about it in a group; I need to have a dialogue."

A conceptual model for improved learning

This section describes a conceptual model for improved learning. This conceptual model, shown in Figure 28.2, is based entirely on the dynamics that surfaced from analysis of the interviews and related literature. Five ovals represent the five traits, each of which has multiple supporting relationships. At the center of the model is psychosocial maturity, which receives positive support from mentorship, counseling, and interaction and engagement.

52 John Medina, *Brain Rules* (Seattle: Pear Press, 2008).
53 Boyer, 73.

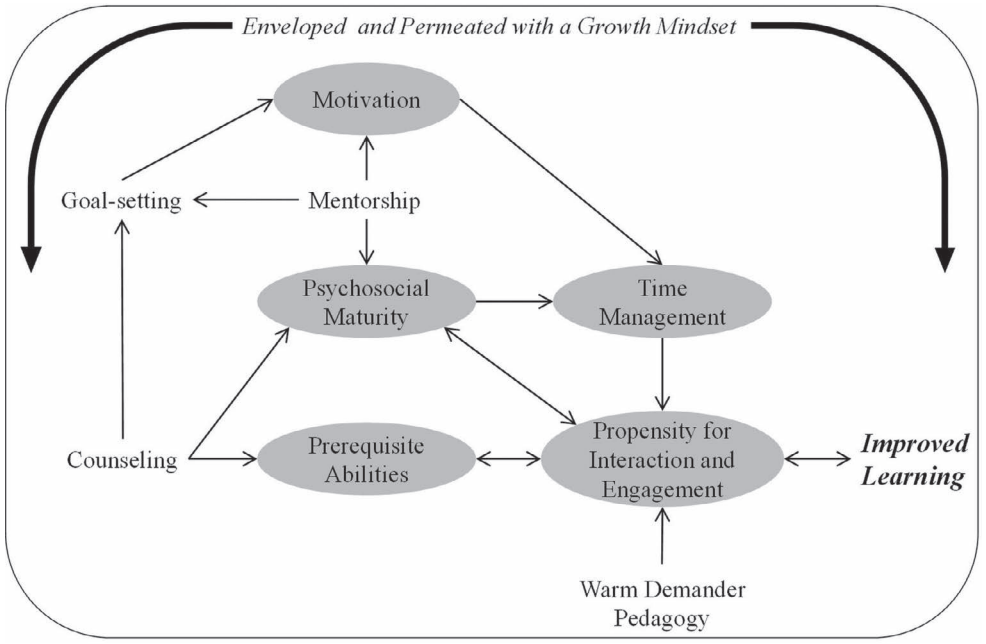

Figure 28.2 A conceptual model for improved learning.

Improved psychosocial maturity should improve time management by improving the responsibility, temperance, and perspective of the student.[54]

Mentorship and counseling also support goal setting, providing a student the opportunity to understand the realm of future possibilities, set discrete and achievable goals, and understand the impact of academic performance. Several students indicated goal setting as an important factor in improving motivation. One student stated, "I had two significant mentors, and they helped me to understand long-term goals." Another student stated "long-term goals and understanding of things beyond West Point made me push hard." There is significant literature explaining the impact of goal setting on task performance, motivation, and self-efficacy.[55] Motivational and psychosocial maturity both support time management, perhaps the least abstract trait within the model. Stated simply, students need to schedule their time appropriately and remain on task for whatever duration is needed to achieve success. As discussed in the previous section on the inequities of college transition, inadequate prerequisite abilities hinder many college students. Counselors and faculty both serve a role in the diagnosis of prerequisite ability shortcomings and the development of a strategy to overcome these shortcomings. The final trait, propensity for interaction and engagement, serves as a gateway to improved learning. Cognitive science research, volumes of higher education research, and common sense all indicate that

54 Steinberg and Cauffman.

55 Edwin A. Locke and Gary P. Latham, "Building a Practically Useful Theory of Goal Setting and Task Motivation," *American Psychologist* 57, no. 9 (2002): 705–707.

student engagement, defined as attention and energy applied to a learning task, positively impacts learning.[56] This intuitive statement is also supported by many of the interviewed students, who attributed their improvement to remaining attentive and focused in class. This engagement must continue beyond the classroom: it includes active, attentive reading and critical thinking. In the college learning experience, human interaction remains a significant component of the engagement required to learn. If people are not involved in the learning process, then a university is not required. Learning could occur solely from a library and the internet. We all realize this is not reasonable. Teachers significantly facilitate the learning process – that is their purpose, hence the word "faculty" deriving from the Latin word *facilis*, meaning to make easy. Human interaction creates the emotions, context, diagnosis of comprehension, and reinforcement that enable learning. The United States Military Academy promotes a program known as additional instruction, or "AI." Many university faculty members hold office hours or periods of time for student questions and individual tutoring, similar to the AI program. However, numerous conditions must exist for students to pursue AI or office hours. Schedules need to align, students must overcome fear and embarrassment, and teachers need to establish a climate that welcomes questions and dialogue. The warm demander pedagogy encourages questions and dialogue inside and outside of the classroom.[57] Warmth welcomes the student; however, demands and high standards insist on thorough understanding, critical thought, and responsible student behavior.

A growth mindset envelops and permeates the entire model. Dweck details the impact of a growth mindset on performance enhancement in her book titled *Mindset: The New Psychology of Success*.[58] In this book she discusses the inventor of the IQ test, Alfred Binet. Dweck includes the following quote from Binet:

> A few modern philosophers . . . assert that an individual's intelligence is a fixed quantity, a quantity which cannot be increased. We must protest and react against this brutal pessimism. . . . With practice, training, and above all, method, we manage to increase our attention, our memory, our judgment and literally to become more intelligent than before.[59]

Cognitive scientists have proven that the brain remains malleable throughout life, and it is only within the last two decades that research refuted the idea that humans were born with a fixed number of neurons that were depleted through life.[60] It is hard to criticize our society for not embracing a growth mindset when leading scientists could only support this theory within recent years.

Interviewed students were asked whether they believed that there were ways to grow strength in intelligence. Many of the students interviewed indicated a tremendously strong growth mindset. Dweck's theories reinforce much of the analysis put forth on the five critical traits presented in this paper. Individuals with a growth mindset exhibit productive help-seeking behavior, attribute performance to appropriate factors, and pursue

56 Astin; Yee.
57 Kleinfeld.
58 Dweck.
59 Alfred Binet, *Modern Ideas About Children*, trans. Suzanne Heisler (Menlo Park, CA: Suzanne Heisler), 107.
60 Medina.

strategies to achieve success. Aronson, Fried, and Good also studied the effect of performance attributions on African American college students. They found that students who embraced a growth mindset reported improved enjoyment of academics, increased academic engagement, and outperformed students that did not embrace a growth mindset.[61]

Concluding thoughts

College is about learning to learn. One of the concluding chapters in *How College Affects Students* summarizes this thought:

> It is likely that gains in college on such dimensions as abstract reasoning, critical thinking, reflective judgment, and intellectual and conceptual complexity also make the student more functionally adaptive. . . . Put another way, the individual becomes a better learner.[62]

There is a fundamental reason why learning to learn is so important – our knowledge and skills today are not capable of solving the problems of tomorrow. Humans must adapt to survive, as they have done for thousands of years. The academic vision statement of the United States Military Academy is to "educate and inspire adaptive leaders of character to build the Army and the Nation's future."[63] The essence of adaptability is learning from your environment and adjusting your behavior to enable future success. This is what we seek in our graduates from the United States Military Academy, and other institutions of higher learning expect similar qualities in their graduates.

In order to adapt, humans must learn new strategies to solve complex problems. Researchers continue to develop methodologies designed to solve various types of complex problems; however, there is one common thread amongst nearly every one of them: emphasis on oral discourse. Humans have historically solved our toughest problems through oral discourse, and humans learn to learn through oral discourse. Oral discourse undoubtedly influenced learning throughout human evolution. Humans have been using language to solve complex problems and survive for a long time. Many scientists believe that humans have been speaking to each other for tens or perhaps hundreds of thousands of years.[64] We are wired, physiologically and psychologically, to talk to each other. It is unsurprising that personal human interaction remains a highly favored and effective method of complex problem solving. Writing systems emerged in 3000 BC and have been credited as a huge advantage for societies, capturing and transferring valuable knowledge.[65] Computers have been commercially available to humans for about 30 years and highly credited for modernizing society and creating tremendous efficiencies. However, when the task at hand involves the transfer of complex ideas, humans constantly resort to personal interaction and oral discourse. Schober and Brennan state that oral discourse is unique because of physical copresence, visibility, audibility, and instantaneous observance

61 Aronson, Fried, and Good, 123.

62 Pascarella and Terenzini, 559.

63 United States Military Academy, "The Dean's Vision" (West Point, NY, 2015), https://portal.westpoint.edu/dean/Pages/vision.aspx.

64 Jared Diamond, *Guns, Germs, and Steel* (New York: W.W. Norton and Company, 1997), 40.

65 Ibid., 218.

of behaviors.[66] However, oral discourse is costly and can be messy. Oral discourse requires devoted time from participants and remains evanescent.[67] Partial statements and utterances can clutter the conversation. Furthermore, this emphasis on oral discourse does not discount the importance of reading, critical thinking, and independent learning. However, in order for students to embrace the thrill of learning, investigate their understanding of complex topics, and share their ideas, oral discourse remains favored. Within the model presented in this paper, oral discourse manifests within mentorship, counseling, goal setting, and interaction and engagement. Although this work promotes the idea of oral discourse for learning, teachers should consistently encourage students to take pride in developing as an independent learner. Oral discourse should not be a crutch for learning to learn; oral discourse should invigorate and elevate the learning experience.

Many opportunities remain for future research in the domain of positive academic improvement. Further narrative-based interviews and structured surveys of students that experienced positive change could continue to explore possible traits that create change. It is also necessary to understand the traits of students that never improve or regress in performance. Furthermore, as theories in psychology and cognitive science continue to emerge and merge, opportunities exist to synthesize results in these fields to better understand how the physical behavior of the brain relates to cognition and learning.

Acknowledgments

The methodology and protocol for the research discussed in this paper was approved by the United States Military Academy Institutional Review Board (IRB) in February of 2015.

66 Michael F. Schober and Susan E. Brennan, "Processes of Interactive Spoken Discourse: The Role of the Partner," in *Handbook of Discourse Processes*, ed. Arthur C. Graesser, Morton Ann Gernsbacher, and Susan R. Goldman (Mahwah, NJ: Lawrence Erlbaum Associates, 2003), 123–164.

67 Ibid.

29 Epistemic expressions of point of view in Russian

A sample system of classroom activities

Olga Dobrunoff

> What the modality system does is to construe the region of uncertainty that lies between "yes" and "no".
>
> Michael A. K. Halliday[1]

Introduction

The paper discusses practical applications of my ongoing research on modality expressions in Russian. It draws on theories, methodology, and practical insights utilized by applied linguistics – an area that explores the relations between theory and practice in language, with particular reference to issues of language use (Schmitt and Celce-Murcia, 2020; Markee, 1990; McCarthy, 2001). In my discipline (teaching Russian as a foreign language), I perceive applied linguistic mostly as research into the teaching and learning of the foreign language, resulting in the creation of teaching materials and contexts that reflect "*the major function of the second language classroom* [is to] *provide intake for acquisition*"[2] (emphasis in the original).

The notion of "modality" is far from being well-defined in linguistics and is largely determined by the scholar's approach to this language category (Bybee and Fleischman, 1995; Coates, 1988, 1990; Cornillie, 2009; Cornillie and Pietrandrea, 2012; Kratzer, 1978; Nuyts, 2001, 2005; Palmer, 2001). This chapter deals with the discourse function of modality, which is defined as the semantic category that

> covers a broad range of semantic nuances (hypothetical, potential, obligative, etc.) whose common denominator is the addition of a supplement or overlay of meaning to the most neutral semantic value of the proposition of an utterance, namely factual and declarative.[3]

1 Michael A. K. Halliday and Christian Matthiessen, *An Introduction to Functional Grammar* (Australia: Hodder Arnold, 2004), 147, www.uel.br/projetos/ppcat/pages/arquivos/RESOURCES/2004_HALLIDAY_MATTHIESSEN_An_Introduction_to_Functional_Grammar.pdf

2 Stephen D. Krashen, *Second Language Acquisition and Second Language Learning* (Internet edition, 2002), 151, www.sdkrashen.com/content/books/sl_acquisition_and_learning.pdf; Norbert Schmitt and Marianne Celce-Murcia, "An Overview of Applied Linguistics," in *An Introduction to Applied Linguistics*, ed. N. Schmitt and M. Rodgers (London and New York: Routledge, 2020); Numa Markee, "Applied Linguistics: What's That?," in *System,* vol.18, no.3, 1990. https://numamarkee.com/system/files/Markee1990.pdf; Michael McCarthy, *Issues in Applied Linguistics* (Cambridge: Cambridge University Press, 2001).

3 Joan L. Bybee and Susanne Fleischman, "Modality in Grammar and Discourse: An Introductory Essay," in *Typological Studies in Language*, ed. J.L. Bybee and S. Fleischman (Amsterdam: John Benjamins, 1995), 2.

The overall objective of the research is to introduce into the classroom the latest findings in applied linguistics to achieve better student learning in Russian communication. The specific objective is to develop and test a system of classroom activities focused on communicative significance of Russian epistemic modality that "can be described as being concerned with the speaker's assumptions, or assessment of possibilities, and, in most cases, it indicates the speaker's confidence or lack of confidence in the truth of the proposition expressed".[4] Specifically, the tasks are to teach students to evaluate information from Russian internet and print sources, acquire competence in forming and articulating their own point of view in oral presentations and discussions in the Russian class, and acquire competence in applying communication strategies for other classroom activities and live interactions with Russian native speakers. Here, as in any interlanguage communication, the notion of point of view is of great importance, as it is a reflection of the speaker's own background assumptions, norms, and values that may be the consequence of the conscious or unconscious representation of a particular ideology.

Linguistically, the realizations of the speaker's point of view are numerous; it is usually expressed in terms of evaluations, epistemology, or social relations via modal expressions offered by natural language. Communicative classroom activities of the time-tested and effective modes (interpretive, interpersonal, and presentational) provide students with ample possibilities to acquire necessary skills in expressing their point of view. Of all the commonly used activities, a classroom oral presentation and discussion lends itself best to interpersonal communication.[5] However, deficiency of Russian modal expressions in students' presentations and discussions could make them sound unnatural and turn their information into uncritical transmissions of someone's ideas and intentions. This is of concern when helping students learn how to express their own point of view and is the reason for special emphasis here to the selection of Russian epistemic modality adverbials grouped together by the semantics of certainty/uncertainty and evidentiality.

The theoretical and practical concerns discussed later imposed certain limitations on the range of Russian epistemic modality expressions intended to be taught in the Russian language classroom. The principal aspects considered were the students' level of Russian language proficiency and relative frequency of the Russian epistemic expressions. The selected group of expressions meets the requirements of the Intermediate Range by the ACTFL Performance Descriptors for Language Learners and includes Russian epistemic adverbials most frequently used in contemporary everyday Russian language.[6]

In developing a system of classroom exercises and activities, I was guided by the principles of (1) constructivism (each cadet should construe his/her own system of the language); (2) proximal goals (which provide clear markers of progress and reduce the risk of demotivation); and (3) communicative significance (language material selected to meet the immediate needs in communication). All exercises are based on a pattern that

4 Jennifer Coates, "Epistemic Modality and Spoken Discourse," *Transactions of the Philological Society*, 1987, www.academia.edu/7231856/EPISTEMIC_MODALITY_AND_SPOKEN_DISCOURSE

5 An oral presentation is a type of Russian language classroom interactivity in the format of a short (5–7 minutes) talk on a topic that is a thematic element of the course syllabus. In an oral presentation, one (or more) students give a talk to a group of classmates and present views on a topic based on their readings or research. The rest of the group then joins in a discussion of the topic.

6 The ACTFL Performance Descriptors for Language Learners, www.actfl.org/sites/default/files/pdfs/PerformanceDescriptorsLanguageLearners.pdf

identifies the communicative task and description of a discourse situation in the form of instruction. Each situation is illustrated with an example.

The paper is structured as follows. First, I will outline a self-contained theoretical framework based on the findings and insights into the concept of modality in linguistic literature. It will be a compromise approach, because many linguistic theoretical and terminological difficulties will be ironed out and it will not be specifically bound to a particular theoretical model of language and grammar. The emphasis instead will be on the role of modality in an interactional or discourse perspective within the discourse-functional approach in applied linguistics. In what follows, this framework will be used to develop a workable model of modality as a linguistic category that involves certain modal systems. Next, the discussion of meanings, features, and functions of the epistemic system of modality will be brought into focus, followed by a didactically motivated model of Russian epistemic and evidential expressions presented in the form of a table. To conclude, some sample exercises will be proposed to demonstrate possible ways of teaching Russian epistemic and evidential modality expressions in contextualized classroom activities.

Discussion

Modality expressions belong to the family of expressive means of natural language. What distinguishes them from other expressive means (e.g., mood or verbals) is their function to qualify the proposition as a whole and that they are not part of the syntactic structure of the sentence. In addition to this qualificational function, modality as an expression of the speaker's point of view has well-recognized interactional, textual, and rhetorical functions, such as persuading, manipulating, challenging, confronting, accepting, and encouraging the flow of discussion. All these functions are in most cases manifested by epistemic modality expressions.

Other most common systems of modality are deontic modality and evidentiality. Deontic modality (from Gk *deon* 'duty') is discourse-oriented non-epistemic modality. Unlike epistemic modality, it refers to acts, not propositions (e.g., Come! Let's go!). Evidentiality or evidential modality expresses the evidence that the speaker has for making a proposition (e.g., "It is said that . . .," "They say that . . .," etc.). It can be qualified as

> an indication of the nature of the sources of information which the speaker (or somebody else) has to assume or accept the existence of in the state of affairs, or of the compatibility of the (postulated) state of affairs with the general epistemological background of the issuer. It covers different subcategories of information source: directly perceived (*experiential*), indirectly deduced (*inferential*), received from others (*hearsay* or *reportative*).[7]

In the linguistic literature, it is often assumed that evidentiality is a kind of epistemic modality, arguing that "with epistemic modality speakers express their judgments about the factual status of the proposition, whereas with evidential modality they indicate the evidence they have for its factual status."[8]

7 Jan Nuyts, "Modality: Overview and Linguistic Issues", in *The Expression of Modality*, ed. William Frawley (Berlin and New York: Mouton de Gruyter, 2005), 10.

8 Frank Palmer, *Mood and Modality* (Cambridge: Cambridge University Press, 2001), 8.

Modality manifests itself in a language-characteristic range of modality expressions (e.g., phonemes, words, phrases, sentences, and texts) that modify the relationship established by the speaker of an utterance to the actual state of affairs at a given moment of speech. Their specific meanings are determined by the context, and this constitutes probably the most significant feature of modality – its context-dependency. It is only in combination with the background context that modality expression takes on a particular shade of meaning. This feature is crucial in developing strategies for teaching modality because learners of a foreign language need to rely on contextual clues to determine what kind of modal meaning a particular utterance is intended to express. This feature explains the necessity to employ as large a context as is practicable in the format of a formal foreign language class organization and oral classroom presentation and discussion, so as to serve the purpose in the most efficient way.

Natural language is probably the most frequent medium for communication. The linguistic content becomes crucial in determining its persuasive success. Writers and reporters for various media use language as an instrument for a desired interpretation of events and relations. "It is here that ideology, point of view, and language intersect."[9] The speaker's point of view indicates a particular way of conceptualizing and refers to an instance of his or her worldview.

On the Russian internet and other media texts, the epistemic function of modality is expressed more explicitly to compel the recipients to accept the information. Usually, it is used to show the speaker's certainty in validity, confidence – sometimes exaggerated – in personal opinion or knowledge, excessive emotionality, sensitivity, sentimentality, harsh and unequivocal evaluation of a person or event. "These features are often associated with Russian national linguacultural properties – straightforwardness and categoricity in judgments. In the English linguistic culture, the tendency to hedge the information is more prominent" (translation mine).[10]

Knowledge of epistemic modality expressions is consciously or unconsciously gained by students from their native language. Their linguistic experiences help them relatively easily grasp the meaning and functionality of many Russian modal expressions by identifying meaningful parallels of its grammatical patterns and those of their mother tongue. Students are familiar with many of them in English: amplifiers or intensifiers (*extremely, absolutely, quite*, etc.) and diminishers or downtoners (*slightly, somewhat, rather*, etc.). They are often called point of view words (or stance words) because they express a speaker's feelings, evaluation, or comments on what the clause is about. Other expressions are called hedging and boosting devices. Hedges are used when the speaker is doubtful that something is true to avoid stating things categorically, to evade sounding too dogmatic and sure of oneself (*perhaps, possibly, likely, maybe*, etc.). Boosters are the ways to express the speaker's confidence, friendly enthusiasm, or intense interest (*certainly, undoubtedly, obviously, definitely*, etc.).

Although the meanings of many Russian epistemic modality expressions could be deciphered by students from the context and their prior knowledge of language modality, still, there are other Russian expressions that are language specific and require sociocultural competence as well as linguistic, communicative, and pragmatic ones. However, before dealing with the selected group of Russian epistemic modal adverbials, a few

9 Paul Simpson, *Language, Ideology and Point of View* (London and New York: Routledge, 1994), 2.

10 Karpoyan, "Epistemic Modality in Internet Commentaries" (PhD diss., 2019), 7, http://cheloveknauka.com/v/587391/a#?page=1

brief remarks on the nature, features, and functions of linguistic modality in general and epistemic modality in particular are worth addressing here, as they can further explain the selection of the Russian epistemic adverbials to be introduced to the cadets.

Russian epistemic expressions

Historically, the Russian language has developed its own system of modality expressions. Consequently, there are a number of areas in which Russian potentially differs from English. First, the modal system of Russian is not as grammaticalized as the English system, in which lexical items historically underwent a type of semantic change into elements that serve a grammatical function (e.g., all English auxiliary verbs, unlike only three to five – depending on the point of view of a scholar – modal verbs in Russian). "[T]his may lead to duplications and ambiguities. Second, the Russian sentence structure differs from the English."[11] Third, the Russian language modality expressions possess certain distinctive features in their semantics and their grammar status. Semantically, they developed into independent, void-of-flexions words (mostly adverbs and particles) and phrases with a broad range of meanings. Grammatically, they do not belong to the sentence structure.

A list of Russian epistemic modality expressions I have compiled would need more than five pages, and still it cannot claim to be complete. It is an open, everchanging set of modalities, with some of them falling out of usage (e.g. *поди* – (arch) used to express surprise, disbelief, bewilderment: must, would, I dare say, I suppose; *натурально* – naturally, of course, etc.) while others come first as a fad (e.g. *типа*/о – kind of like/sort of like/like (*a parasitic filler word*); *по ходу* – kind of like/sort of like/like (*a parasitic filler word*), etc.) and then become the standard, while others remain substandard (e.g. *реально* – objectively, seriously; *четко* – really, of course, etc.).

The theoretical and practical concerns discussed earlier imposed certain limitations on the range of Russian epistemic modality expressions to be taught in the Russian language classroom. Further limitations are relative frequency and the students' level of Russian language proficiency. *The New Frequency Dictionary of the Russian Language* by O. Lyashevskaya and S. Sharov (translation mine) was used to check relative frequency of Russian modal adverbials, with the most frequent to be selected as the target group.[12] Further limitation was used to meet the requirements of the Intermediate Range by the ACTFL Performance Descriptors for Language Learners, which corresponds to the second certification level by the Lexical Minimum of Russian as a Foreign Language (translation mine).[13]

The selected group of the Russian epistemic modality adverbials is arranged in a table presented by descending relative frequency.[14]

Classroom activities

Learning to express certainty and uncertainty in Russian is a complex task. My experience suggests that getting Russian epistemic adverbials through unconscious acquisition alone could be a long and chaotic process for students – they will certainly benefit from

11 Ferdinand de Haan, "Strong Modality and Negation in Russian", *Using Corpora to Explore Linguistic Variation* (posted 2002), 93. www.academia.edu/755490/Strong_modality_and_negation_in_Russian

12 O. Lyashevskaya and S. Sharov, *Новый Частотный Словарь Русского Языка*. http://dict.ruslang.ru/freq.php

13 Lexical Minimum of Russian as a Foreign Language, https://ru.pdfdrive.com/Лексический-минимум-по-русскому-языку-как-иностранному-2-сертификационный-уровень-d176223930.html

14 See Appendix A.

explicit instruction in the classroom. This conclusion is supported by extensive literature on teaching pragmatics (see Bardovi-Harlig, 2001, 2010; Bardovi-Harlig and Bastos, 2013; Barron, 2003).

The process of instruction from vocabulary input to speech interactivity in the form of classroom oral presentation and discussion discourse proves to be very efficient. A conscious study of Russian language modality expressions should start with identifying and interpreting them in the target language and then contrasting them with close analogies in English. How are the meanings of these modal structures similar? How are they different? What are all the factors that influence how they are used in conversation?

The environment of oral classroom presentation and discussion does not require students' special skills, since face-to-face interaction is in many senses prototypical – it is familiar to them from their school experience, and it is the form in which they are first exposed to language. With context dependency being an important feature of modality, this type of classroom discourse can be a very fruitful environment in which to learn the complex and subtle patterns of modality produced by Russian speakers.

In developing a system of classroom exercises and activities, I was guided by the principles: (1) constructivism (each student should construe his/her own system of the language); (2) proximal goals (which provide clear markers of progress and reduce the risk of demotivation); and (3) communicative significance (language material selected to meet the immediate needs in communication).

The sample exercises presented here are intended to prepare students to use Russian epistemic modality expressions in oral communication – first of all, in oral presentations and discussions and then in the out-of-class environment, e.g., when they travel abroad.

It is believed that the sample exercises could be easily integrated by instructors in any contextualized model both as regards the textbook material and the ample classroom interactivities available to students. All exercises are based on a pattern that identifies communicative task and description of a discourse situation in the form of instruction. Each situation is illustrated with an example.[15]

Summary

The theoretical considerations and practical suggestions presented in this paper are part of my ongoing work in the development of new approaches to help cadets learn not only new words and grammatical constructions but also new meanings and new ways of speaking. It is intended to show them that they have to learn how to qualify their statements and differentiate degrees of "epistemic commitment" if they want to speak in Russian with the appropriate degree of conviction.

A preliminary analysis of the discussed system application suggests that the use of the selected Russian epistemic adverbs by the students was associated with complex interactions between the activity type and the student's personal style. The students demonstrated sensitivity to pragmatic dimensions of the activity task as well as to individual activity requirements and adjusted their speaking styles accordingly. These findings could help to reach a deeper understanding of point of view formulation and subjectivity in foreign language.

15 See Appendix B.

Future research concerning teaching Russian modality could include levels of proficiency in which cadets understand and use modality expressions of other Russian modality systems as well as other expressions within the system of epistemic modality, for example, the expression of probability through adjectives, verbs, and projecting clauses (e.g., "I think that . . ."), but also other modal systems of Russian across the general category of modality. These should be introduced at different stages of proficiency, and systems of specially designed exercises should be developed.

Appendix A

The selected group of the Russian epistemic modality adverbials (by descending relative frequency).

Определенность, уверенность Certainty, confidence		
Russian word or phrase	*Example in a sentence*	*English equivalents*
конечно (647.3)*	*Целью наших общих усилий,* ***конечно****, является устойчивое развитие.*	Of course, certainly Definitely
естественно (100.8)	*Составление текстов международных соглашений является,* ***естественно****, ответственностью самих государств.*	Naturally, obviously, clearly
разумеется (99.7)	После *11 сентября,* ***разумеется****, все изменилось.*	Of course, certainly, obviously
безусловно (46.2)	*Его мнение,* ***безусловно****, заслуживает внимания.*	Certainly, clearly, obviously
несомненно (35.0)	*Особая роль здесь,* ***несомненно****, принадлежит Организации Объединенных Наций.*	Surely, clearly, undeniably
Неопределенность, сомнение, предположение Uncertainty, doubt, assumption		
наверно(-е) (220.2)	*Теперь,* ***наверное****, он может подумать о женитьбе.*	Hopefully, most likely, perhaps
возможно (161.8)	*Предоставление гуманитарной помощи,* ***возможно****, является наиболее важной и плодотворной деятельностью Организации Объединенных Наций.*	Maybe, perhaps, probably, possibly
кажется (143.2)	*Мы,* ***кажется****, опаздываем.*	It seems, looks like
видимо (136.4)	*Он,* ***видимо****, никогда не сможет забыть прошлое.*	Apparently

пожалуй (93.9)	*Финансовый кризис Организации Объединенных Наций достиг,* ***пожалуй****, беспрецедентных масштабов.*	Rather, possibly, probably, if anything
Описание источника информации The source of information description		
говорят (52.6) (не известен)	*Настоящий плов,* ***говорят****, можно попробовать только в Узбекистане.*	They say
по словам\выражению (74.2) (известен)	*Эти планы,* ***по словам*** *Администрации, охватывали основную часть социальной политики в 1997 году.*	According to, in someone's words
по мнению (69.8) (известен)	*Однако,* ***по мнению*** *многих государств-членов ООН, только обсуждения явно не достаточно.*	According to, in the view of
по слухам (64.7) (не известен)	*За ним находится таинственная черная башня, в которой,* ***по слухам****, обитает злой людоед.*	Rumor has it that, by hearsay

*ipm – instances per million words.

Appendix B

Exercises in Russian epistemic modality expressions.

Exercise One. Rewrite the following sentences, making them more/less categorical.

1 Часть этих глаголов, *разумеется*, относится к литературному русскому языку, например: скандалить, нянчить, стыдить, рыбачить.
2 На фотографии они стоят на фоне военной палатки и это, *несомненно*, было во время их совместной службы в армии.
3 Он шёл со стороны здания казармы и, *безусловно*, видел, как мы выходили из столовой.
4 Со стороны, *конечно*, виднее.
5 Нам, *возможно*, необходима полная реорганизация бизнеса.
6 Неплохой вариант, подумала я; даже, *наверное*, самый оптимальный.
7 Он, *кажется*, совсем ничего не помнит.
8 Ему, *пожалуй*, не следовало этого говорить.

Exercise Two. Ask a qualifying question to the statement with partial negation. Answer the question using modal expressions of certainty, uncertainty, or reference to unknown source.

a Example: Ну, *Войну и мир* написал не Пушкин. – – А кто же тогда? – Толстой, *конечно*.
b Example: Ну, *Войну и мир* написал не Пушкин. – – А кто же тогда? – Толстой, *наверное*.
c Example: Ну, *Войну и мир* написал не Пушкин. – – А кто же тогда? – *Говорят*, Толстой.

1) Нет, это сделал не Виктор. 2) Нет, Анна не спрашивала об этом. 3) По-моему, Сергей живёт не в общежитии. 4) Похоже, Пётр отсутствовал не по болезни.

Exercise Three. React to the question by repeating it; then answer it using modal expressions of certainty, uncertainty, or reference to unknown source.

a Example: Куда мы идём после обеда? – Куда мы идём после обеда? *Кажется*, в галерею.
b Example: Куда мы идём после обеда? – Куда? *По-видимому*, в галерею.
c Example: Куда мы идём после обеда? – Как куда? В галерею, *конечно*!
d Example: Куда мы идём после обеда? – После обеда? *Как сказала сестра*, после обеда мы идём в галерею.

4) Где мы соберёмся? 2) Какая завтра будет погода? 3) Какое сегодня число? 4) Какой у нас первый урок? 5) Чьи эти журналы? Б) Кто взял магнитофон?

Exercise Four. On the materials related to a week/month's course topic and the list of suggested Russian epistemic modal expressions, prepare and train in class the following discourse: How to agree with the point of view/with other people's ideas.

Example: А – Опоздание на занятие считается грубым нарушением дисциплины.
В – (1) С этим трудно не согласиться, (2) потому что, *безусловно*, опоздание на занятие отвлекает от учебы и отнимает время у преподавателя и товарищей по группе.

1) В спорте самое главное тренировки. 2) Выбор иностранного языка – это всегда обдуманный шаг. 3) Курсант может сам объективно оценить свои успехи в учебе. 4) Компьютер никогда полностью не заменит книгу.

Exercise Five. On the materials related to a week/month's course topic and the list of suggested Russian epistemic modal expressions, prepare and train in class the following discourse: How to disagree with the point of view/refute other people's ideas.

Example: А – Опоздание на занятие считается грубым нарушением дисциплины. В – (1) С этим, *конечно*, трудно поспорить, однако . . . (2) опоздание может быть по уважительной причине. (3) Нужно, *безусловно*, учитывать такие обстоятельства и делать исключения.

1) В спорте самое главное тренировки. 2) Выбор иностранного языка – это всегда обдуманный шаг. 3) Курсант может сам объективно оценить свои успехи в учебе. 4) Компьютер никогда полностью не заменит книгу.

30 The validity of the college entrance examination rank in predicting student success in chemical engineering

Predicting academic success

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Introduction

Most institutions of higher learning use standardized tests, such as the SAT or ACT, as admissions criteria; however, the use of such tests as a neutral predictor of future college success is debated.[1] A 2018 study suggests that ending SAT and ACT requirements can result in both increased applications and greater applicant diversity.[2] Some individual institutions or school systems, such as the University of California System, are considering eliminating standardized tests from admissions criteria, instead focusing on high school performance.[3] Other performance metrics, such as high school grades and class rank, are also normally considered in the admissions process. Independent of the method used – standardized tests, high school performance metrics, or a combination of numerous predictors – each institution needs to develop a set of admissions criteria that best suits the institution's mission and vision.

West Point is an undergraduate-only institution that has a unique mission:

> To educate, train, and inspire the Corps of Cadets so that each graduate is a commissioned leader of character committed to the values of Duty, Honor, Country and prepared for a career of professional excellence and service to the Nation as an officer in the U.S. Army.[4]

1 Kobrin, Jennifer L., Brian F. Patterson, Emily J. Shaw, Krista D. Mattern, and Sandra M. Barbuti, "Validity of the SAT for Predicting First-Year College Grade Point Average." *College Board Research Report 08-5*, 2008, 10.

2 Belasco, A., E. Blalock, W. Bowen, J. Brooks, M. Chingos, J. Hearn, M. Hurwitz, et al. Measuring Success. Edited by Jack Buckley, Lynn Letukas, and Ben Wildavsky (Baltimore, MD: Johns Hopkins University Press, 2018).

3 Atkinson, R., "Achievement Versus Aptitude Tests in College Admissions," *Issues in Science and Technology* 18, no. 2 (2001): 31–36; Geiser, S., and Roger S., "Validity and Fairness in Technology- Based Assessment : Detecting Mathematics Task Validity and Fairness in Technology-Based Assessment : Detecting Construct-Irrelevant Variance in an Open-Ended, Computerized Mathematics Task," *Educational Assessment* 8, no. 1 (2002): 1–26. https://doi.org/10.1207/S15326977EA0801.

4 "West Point Mission Statement." Accessed April 17, 2019. https://westpoint.edu/about/SitePages/Mission.aspx.

To produce leaders of character able to serve as officers in the Army, West Point needs to ensure each cadet admitted can excel in areas beyond academics, to include leadership, physical fitness, and moral character. These requirements create a relatively unique admissions algorithm – the Whole Candidate Score (WCS), which incorporates nonacademic attributes such as physical fitness and leadership abilities. The academic portion of the WCS, known as the College Entrance Examination Rank (CEER) score, is determined by an algorithm that accounts for SAT and ACT scores (whichever is higher) and high school class rank normalized by size and competitiveness of the school. The CEER score is the metric that we use as the basis of comparison in this study. The CEER score algorithm has not changed since 1995 despite adjustments to standardized test scoring. Recently graduated Second Lieutenant Hailey Conger wrote her senior thesis arguing for an update to the CEER algorithm.[5] While her thesis was extremely well researched, the changes have not been adopted largely due to findings by a 2015 RAND study.

The RAND Corporation completed a study in 2015 considering the WCS and CEER scores that was commissioned by the Undersecretary of Defense, Director of Accession Policy. The study explored the effectiveness of admission criteria used between 1992 and 2001 in predicting metrics of success, e.g., retention, promotion rates, early selection for promotion, etc. Individuals were tracked as each progressed through their career – from cadet candidates to cadets to graduates and officers. The study determined two findings relevant to our analysis: (1) that there was a statistically significant correlation between higher WCS and graduation rates, and (2) the CEER score was a statistically significant predictor of graduation from West Point.[6]

In addition to graduation from West Point and future Army performance, the CEER score may be useful in predicting success for other achievements, such as performance on the Fundamentals of Engineering Examination (FEE) and success in the chemical engineering program. The National Council of Examiners for Engineering and Surveying (NCEES) first administered the FEE in 1965.[7] Those that pass the FEE earn status as an Engineer-in-Training (EIT). The exam is also a prerequisite for individuals intending to obtain licensure as a Professional Engineer. The average FEE pass rate for chemical engineers in 2017 was 77%.[8] The purpose of our study was to examine longitudinal CEER score and FEE data from West Point chemical engineering majors (2006 to 2018) to determine if there was a statistically significant correlation between CEER scores and success on the chemical engineering FEE. Our study also examined if any correlation between CEER scores and success in the chemical engineering program (measured by major GPA) could be identified. We examined the change in Cumulative Quality Point Average (CQPA), which is akin to GPA at other universities, from first semester to graduation in the chemical engineering major to examine how GPAs changed

5 Conger, H., *Predicting Academic Success at West Point Using the SAT and High School Class Rank Scores* (U.S. Military Academy, 2019).

6 Hanser, L. M., and Mustafa Oguz. *United States Service Academy Admissions: Selecting for Success at the Military Academy/West Point and as an Officer, 2015* (Santa Monica, CA: RAND Corporation, 2015). http://www.rand.org/pubs/research_reports/RR723.html.

7 Lumos, R., W. LeFevre, F. Loudon, D. Curtis, and O.B. Sr. Curtis. *The History of the National Council of Examiners for Engineering and Surveying 1920–2004.* Edited by Joanna Corley. 3rd ed. (Clemson, SC: National Council of Examiners for Engineering and Surveying, 2004).

8 "National Council of Examiners for Engineering and Surveying." Accessed April 17, 2019. https://ncees.org/engineering/fe/.

throughout the undergraduate experience. We expected to find a drop in GPA for the chemical engineering majors due to the rigor of the courses and the additional course load required relative to other majors – 2.5 courses more than the standard course load at West Point. We also initially hypothesized there would be a statistically significant correlation between higher CEER scores and success on the chemical engineering FEE and success in the chemical engineering program.

Methods

Data for this study was derived from West Point's Academy Management System (AMS), a web-based repository for grades, and historical cadet academic records maintained by the Department of Chemistry and Life Science. Data used in our analysis included initial entry scores (WCS and CEER), GPAs, and FEE scores for all chemical engineering majors in West Point graduating classes from 2006 to 2019. All data was merged and de-identified prior to analysis in accordance with the West Point Institutional Review Board, HRP 19-044.

All West Point graduates complete a robust core curriculum in addition to chemical engineering major courses (Figure 30.1). Chemical engineering majors complete 91.5 credits within the core curriculum (non-underlined courses in Figure 30.1) and 57 credits within the major (shown underlined in Figure 30.1).

Chemical Engineering

United States Military Academy

Example Schedule for Chemical Engineering, Classes of 2020 and Beyond

Fall Term	Course	Credit Hours	Spring Term	Course	Credit Hours
4th CLASS					
MA103	Math. Modeling & Intro. Calculus	4.5	MA104	Calculus I	4.5
CH101	General Chemistry I	4.0	CH102	General Chemistry II	4.0
EN101	Composition	3.0	EN102	Literature	3.0
HI107	Western Civilization	3.0	HI108	Regional Studies in World History	3.0
IT105	Introduction to Computing & IT	3.0	PL100	General Psychology	3.0
PE11x	Combatives / Boxing / Movement	0.5	MS100	Introduction to Warfighting	1.5
			PE150	Fundamentals/Personal Fitness	1.5
3rd CLASS		Total 18.0			Total 20.5
MA205	Calculus II	4.0	*CH362*	*Mass and Energy Balances*	*3.5*
PH205	Physics I	4.0	*MA364/5*	*Applied Engineering Math*	*3.0*
Lx203	Foreign Language	4.0	PH206	Physics II	4.0
SS201	Economics	3.0	Lx204	Foreign Language	4.0
PY201	Philosophy	3.0	SS202	American Politics	3.0
MS200	Fundamentals: Army Operations	1.5	EV203	Physical Geography	3.0
			PE 2xx	Lifetime Physical Activity	0.5
2nd CLASS		Total 19.5			Total 21.0
CH363	*Separation Processes*	*3.5*	*CH364*	*Chemical Reaction Engineering*	*3.5*
EE301	*Fundamentals of Electrical Engineering*	*3.5*	*CH367*	*Introduction to Automatic Process Control*	*3.0*
CH383	*Organic Chemistry 1*	*3.5*	*MC312*	*Thermal-Fluid Systems 2*	*3.0*
MC311	*Thermal-Fluid Systems 1*	*3.5*	*MC300*	*Fundamentals of Eng. Mech. & Design*	*3.0*
PL300	Military Leadership	3.0	SS307	International Relations	3.0
MA206	Probability and Statistics	3.0	MS300	Platoon Operations	1.5
PE32x	Survival Swimming	0.5	PE360	Combat Applications	1.5
1st CLASS		Total 20.5			Total 18.5
CH459	*Chemical Engineering Laboratory*	*3.5*	*CH402*	*Chemical Engineering Process Design*	*3.5*
CH365	*Chemical Engineering Thermodynamics*	*3.0*	*CH400*	*Chemical Engineering Prof. Practice*	*1.5*
CH485	*Heat & Mass Transfer*	*3.5*	*Elective*	*Engineering Elective 3*	*3.0*
Elective	*Engineering Elective 1*	*3.0*	HI302	History of the Military Art	3.0
Elective	*Engineering Elective 2*	*3.0*	LW403	Constitutional & Military Law	3.0
PE450	Army Fitness Development	1.5	MX400	Officership	3.0
		Total 17.5			Total 17.0

Figure 30.1 Course load over four years as a chemical engineering major at West Point

Our experimental design centered around comparing CEER scores to a series of different metrics. We chose FEE performance as the primary metric for analysis due to the exam's national recognition and the fact the exam is developed by an independent professional organization. Cumulative grades in the form of GPAs from major courses and West Point core courses were considered secondary metrics for analysis. To compare CEER scores and success in the chemical engineering program (i.e., GPA in major), we used linear regression analysis to assess aggregated cadet data (CEER scores and GPA) from West Point classes 2006 to 2018. We then consolidated CEER scores into three bins to conduct additional regression analyses: (1) CEER scores < 600, (2) CEER scores between 600 and 700, and (3) CEER scores > 700 to 800. In the admission process, CEER score is primarily used to determine graduation potential. A CEER score < 520 normally denotes the "at risk" population, while a CEER score > 649 normally denotes the "scholar" population.[9] We also employed linear regression to assess CEER scores and graduating GPA (i.e., GPA earned from all courses taken at West Point). To gain a more comprehensive understanding of cadet performance and explore whether CEER scores are better at predicting overall academic success (vice just success in the major), we used the cadet Cumulative Quality Point Average (CQPA). CQPA, which is akin to GPA at other universities, is an index of cumulative performance in all academic, military science, and physical education courses. To explore whether majoring in chemical engineering negatively impacted cadet GPAs, we analyzed chemical engineering cadet GPAs following the completion of their first semester against their graduating GPAs using probability density function plots. Last, we observed the data to be binary and used box plots to examine the relationship between CEER and FEE scores.

Results and discussion

Chemical engineering student demographics

The chemical engineering program at West Point was established in 2006 and received formal ABET accreditation starting in 2012. From 2006–2018, 238 cadets declared chemical engineering as their major – of that number, 46 cadets dropped the major prior to graduation. The average CEER score for cadets who dropped the major was 614 +/− 46. Table 30.1 shows aggregated data for the remaining 192 chemical engineering graduates. The average CEER score of chemical engineering graduates was 651 +/− 60, while their average graduating GPA was 3.36 +/− 0.43. The mean CEER score for the class of 2019, all majors, was 618.[12] The average passing rate on the FEE for the 192 graduates was 86%. Taking the FEE became mandatory for cadets in 2010; prior to then, nine graduates elected to not take the FEE. Characteristics of cadets majoring in chemical engineering have remained relatively consistent over time. At the time of this publication, there were 90 cadets enrolled in the chemical engineering major (West Point classes of 2019, 2020, 2021, and 2022). This cohort had an average CEER score of 651 +/− 55.

9 Eslinger, M., T. Hill, and M. Cowan. "Strategies to Corelate Admissions Criteria to Performance in Stem Coursework for Non-Science Majors," in *Strategies To Corelate Admissions Criteria To Performance In STEM Coursework For Non-Science Majors* (2018).

Table 30.1 West Point Chemical Engineering Program aggregated data, 2006–2018

Total Chemical Engineering Graduates	192
Total Cadets Declaring Major	238
% of Cadets who Remain in the Major through Graduation	80.67%
Average CEER Score	651 ± 61
FEE Success Rate	86.45%
Average GPA	3.39 ± 0.47

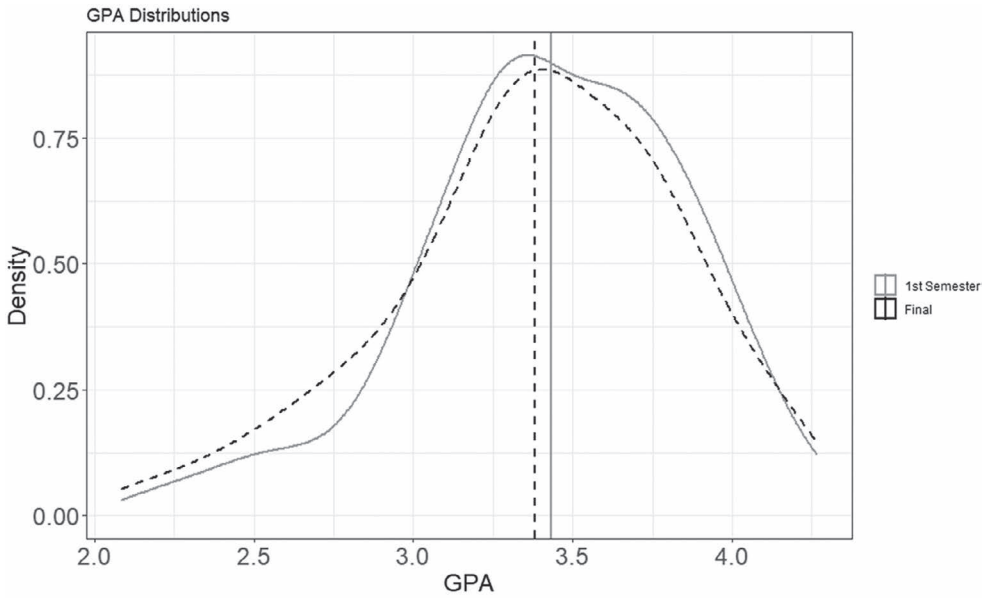


Figure 30.2 Probability density function plot of first semester GPA (gray solid line) versus graduating GPA (dashed line) for all chemical engineering majors in West Point classes 2006 to 2018.

Relationship between first semester CQPA and graduating CQPA for chemical engineering majors

Figure 30.2 depicts a probability density plot for first semester CQPA versus CQPA at graduation for chemical engineering majors. As shown, there is a difference in means of ~0.05 (p-value of 0.027) indicating a statistically significant difference between the two populations. The mean CQPA for chemical engineering majors decreased from the first semester through graduation (i.e., by the eighth semester). While the decrease in mean is relatively small, 1.25%, a much larger study of 12,667 undergraduates in all majors suggested that GPA generally increases as students progress through courses in their major. Specifically, undergraduates saw an average increase in GPA of 8.7% (0.26 points) over

the same eight semester period.[10] This result suggests a net decrease in GPA off the mean of ~10% for cadets choosing to major in chemical engineering at West Point.

We initially postulated that the CQPA of chemical engineering majors would decrease due to the increased course loading and rigors of the curriculum; however, a net decrease of ~10% was unexpected. The impact of a decrease in CQPA at West Point due to major can have substantial impacts. Traditionally, order of merit (OML) based on cadet performance score, in conjunction with cadet preference, was used to determine branch and post assignments. While the process for determining branch and post assignments is changing at the time of this article, cadet academic performance is still a significant factor. Choice of branch and initial post can factor significantly in an officer's long-term retention in the Army.

While further exploration of other engineering disciplines is needed, this finding suggests that engineers may be at a disadvantage in CQPA relative to nonengineering majors and that perhaps a reevaluation of CQPA for engineering disciplines at West Point is warranted.

CEER score as a predictor of FEE success

Figure 30.3 depicts box plots showing success (i.e., a passing score) and failure on the FEE in terms of CEER score. As shown, of the 183 chemical engineering majors who took the FEE, 157 passed and 26 failed. As median values do not overlap in Figure 30.3, we are 95% confident that the median CEER score for those who passed and those who failed the FEE are different. The median CEER score for cadets who pass the FEE is 665, while the median CEER score for cadets who failed is 570.

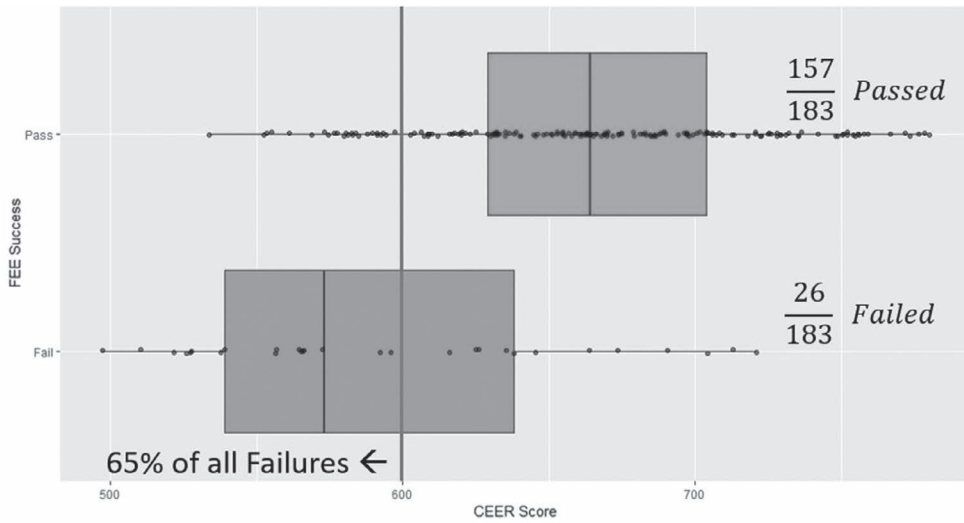


Figure 30.3 Distribution of CEER scores between Pass/Fail FEE populations

10 Grove, Wayne A., and T. Wasserman. "The Life-Cycle Pattern of Collegiate GPA: Longitudinal Cohort Analysis and Grade Inflation," *Journal of Economic Education* 35, no. 2 (2004): 162–74. https://doi.org/10.3200/JECE.35.2.162-174.

These data suggest that our hypothesis is correct with regard to CEER score as a predictor of FEE success: cadets with higher CEER scores have an increased likelihood of passing the FEE. An increase of one point in CEER makes the cadet 0.018 times more likely to pass the FEE; an increase of 10 points in CEER makes the cadet 0.2 times more likely to pass. Sixty-five percent (17 of 26) of total FEE failures had a CEER score below 600. Of note, cadets with a CEER score below 530 have a 100% fail rate. Only two cadets in 12 years passed the FEE with a CEER score below 550.

While all cadets should be afforded the opportunity to choose any major, this finding suggests that cadets with lower CEER scores are less likely to pass the FEE. As the FEE is an important gate for future engineers, as those passing the FEE earn status as an Engineer-in-Training (EIT), cadets with low CEER scores who are at risk of failing the FEE should strongly consider the costs and benefits prior to selecting a major that requires them to take the FEE. At a minimum, they should begin their FEE preparation early to mitigate the heightened risk of failure. Department academic counselors should consider CEER scores when advising cadets concerning major selection, and known risks (i.e., likelihood of FEE failure) should be discussed in detail prior to final selection.

CEER as a predictor of CQPA and major GPA

We conducted linear regression analyses using CEER score as a predictor of two variables of interest: CPQA and cadet GPA in the chemical engineering major. Linear regression analysis of CEER score and CQPA showed a coefficient of determination (R^2) of 0.321, suggesting a weak positive relationship (Figure 30.4). When we subset CEER scores into three bins (< 600, 600–700, > 700), the R^2 values determined by regression analysis decreased to 0.0854, 0.0396, and 0.0136 for each bin respectively, suggesting

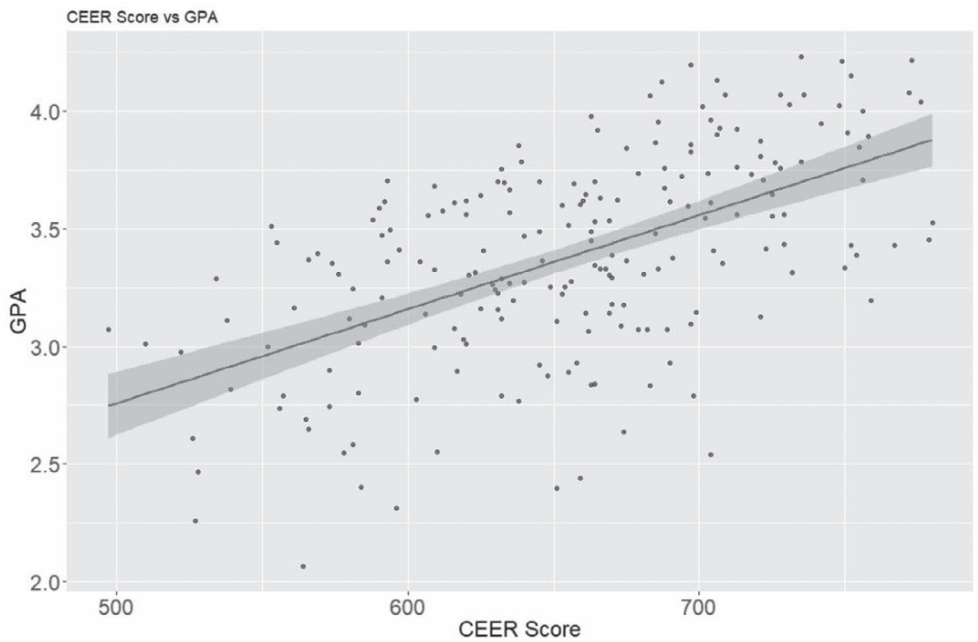


Figure 30.4 Linear regression model of CEER versus cumulative GPA at graduation. The shaded areas around the lines depict 95% confidence intervals for the true slope parameter.

very weak positive or no statistical relationship between the predictor and binned CQPAs (Figure 30.5).

Figure 30.6 depicts the linear regression plot for CEER and GPA in chemical engineering major courses. Here the coefficient of determination (R^2) is 0.269, suggesting a

Figure 30.5 Linear regression model of CEER versus cumulative GPA at graduation by bin. The shaded areas around the lines depict 95% confidence intervals for the true slope parameter.

Figure 30.6 Linear regression analysis of CEER versus program GPA at graduation.

Figure 30.7 Linear regression analysis of CEER versus program GPA at graduation by CEER bucket.

weak positive relationship. We again subset CEER scores into three bins, which produced coefficients of determination of 0.118, 0.0186, and 0.00154 (for CEER scores of < 600, 600–700, and > 700 respectively) (Figure 30.7). These relatively low R^2 values suggest very weak positive or no relationship between binned CEER scores and GPA in major.

As indicated by the coefficients of determination from regression analysis, CEER score is not an accurate predictor of CQPA or cadet GPA in the chemical engineering major. Aggregated scores (Figures 30.4 and 30.6) produce a higher R^2 than binned scores, suggesting that binned models are not accurate. The worst coefficient of determination for both variables of interest was for the scholar population (CEER > 700), suggesting that cadets with high CEER scores are just as likely to have low CQPA/major GPAs than high CQPA/major GPAs. An examination of Figures 30.5 and 30.7 show that some scholar population cadets have even approached the failing mark (CQPA of 2.0).

Conclusion

This study answered several questions regarding the use of admissions criteria as predictors of academic success in the chemical engineering major at West Point. Majoring in chemical engineering is challenging at any university, but choosing to do it at West Point, where cadets' schedules are deliberately crowded with competing commitments, requires a unique type of individual. The average CEER score amongst the population who dropped the major prior to graduation was lower by almost a full standard deviation from the average CEER score of those who graduated in the major. The analysis of

GPA data revealed a statistically significant drop in GPA from first semester to graduation GPA, whereas other studies demonstrated the opposite trend for the overall undergraduate population of a large university. The data suggests a 10% decrease in GPA for chemical engineering majors relative to the average undergraduate student. Admission metrics such as the CEER score, which combine SAT/ACT performance with high-school performance, are effective indicators of success on the FEE, the culminating event for most chemical engineering undergraduates. The bucket approach to analyzing CEER scores, while ineffective for GPA, proved highly effective when analyzing FEE results. Cadets with a CEER score below 600 have a passing rate of 32%, whereas the average passing rate on the FEE for the entire chemical engineering major is 86%. We found very little correlation between CEER and GPA, either in the major or overall. Future efforts will expand the scope of the first semester vs. final GPA analysis to other majors at West Point.

31 An investigation on the effect of out-of-class assignments on student performance

The homework tightrope

Daniel J. Newell and J.D. Caddell

Introduction

Like other top-tier academic institutions, the United States Military Academy (USMA) at West Point provides an excellent undergraduate education. After four years of rigorous learning and coursework, cadets graduate with a high-quality bachelor of science degree and the ability to think and solve complex problems. However, the learning environment in which cadets navigate to achieve this outcome varies greatly from other institutions and is ultimately what makes USMA unique. By design and undoubtedly so, cadets at West Point are, in a word, overloaded. Cadets are intentionally given more academic coursework than they can manage in any given 24-hour period, regardless of individual intellectual capability or whether the student deliberately wants a replete academic course schedule. Every cadet must complete all mandatory requirements and graduate within four years. As such, cadets become masters at prioritization. They "rack and stack" requirements, conduct hasty risk and reward tradeoffs, cut out all work deemed slightly less important, and try to make decisions in alignment with their desired academic goals. Coupled with additional physical, military, and leadership requirements and perhaps inadequate sleep, this strained learning environment creates a distinctive academic atmosphere in which time management becomes the priority. Faculty members also operate in this environment and must seriously consider these conditions. The truly successful faculty members appear to deeply understand USMA's unique learning environment and carefully consider the impact this environment has on all that they do – how they conduct their classes, how they engage their students in the learning process each day, and especially how they design their courses.

The four-year West Point experience is structured around three coordinated and integrated programs (referred to as "pillars") – academic, military, and physical – and is designed at its core to develop cadets into well-rounded individuals. Members of the dean's faculty, as part of the academic "pillar" of cadet development, are charged with establishing the intellectual foundation for cadets, who unlike students at other universities, upon graduation will not go into a civilian career-field aligned with their academic major but will become commissioned officers in the United States Army.[1] In our experience, USMA faculty strive to be consummate professionals and do not take the responsibility of intellectual development lightly. Whether it is formally through faculty development workshops, conferences and seminars, ongoing research, the two-year

1 "USMA Faculty Manual: A Blend of Excellence." November 2014.

Master Teacher Program (MTP), or informally through countless office-mate and lunch discussions theorizing how to better reach cadets, the faculty at USMA are committed to getting the academics at USMA "right."

What does getting it right look like, specifically in the academic environment described here? As faculty members and course directors ourselves, how we design our courses – the evaluation metrics we use and what we ask our students to do outside of the classroom – can take on an infinite number of possibilities, all with varying levels of effectiveness. Furthermore, it should not be forgotten that the cadets themselves play the primary role in the learning process. In fact, the *USMA Academic Program Guide* unmistakably communicates this idea; that academic ownership is an individual obligation, while acknowledging that a cadet's day is filled with competing requirements. Cadets are uniquely charged:

> The primary responsibility for attaining satisfactory academic performance rests with the individual cadet. . . . To meet this responsibility, cadets have an obligation to know their academic status, manage their time, and establish priorities in such a manner as to accomplish this goal.
>
> – *Red Book*[2]

Cadets understand this sentiment, with one cadet sharing that "everything at the academy is about self-responsibility, taking ownership for finding your own way to the objective."[3] Therefore, given West Point's academic environment, we sought to explore the following pedagogical questions about course design:

- What amount of outside-of-class content should be assigned and evaluated?
- Do outside-of-class assignments impact Term End Exam (TEE) performance?

As the author of *Make it Stick* states, "the responsibility for learning rests with every individual, whereas the responsibility for education rests with the institution."[4] As fellow educators responsible for the development of curriculum, we understand the critical role we play in a cadet's education. We believe the structure of a course significantly impacts the learning process. This chapter presents initial findings to the pedagogical questions posited and explores the effectiveness of three different course design techniques as a case study analysis conducted over three consecutive semesters from one course in the Department of Systems Engineering (DSE). Though the study is narrow in scope, we believe the ideas presented in this paper offer broad application to other departments and courses.

Background

One distinguishing aspect of the West Point academic experience is a cornerstone instructional system called the Thayer Method, developed nearly 200 years ago by a superintendent and "father of West Point," Sylvanus Thayer.[5] Under this method, students are

2 U.S. Military Academy, *Academic Program: Curriculum and Course Descriptions* (West Point, NY: United States Military Academy, 2019).

3 Brown, Peter, *Make It Stick* (Cambridge, MA: The Belknap Press of Harvard University Press, 2014), 235–236.

4 Brown, *Make It Stick*, 252.

5 Shell, Amy, "The Thayer Method of Instruction at The United States Military Acadmey: A Modest History and A Modern Personal Account." *PRIMUS* 12 (2002): 27–38.

expected to come to class having already begun the learning process; cadets should prepare for the upcoming lesson on their own prior to the start of class by studying lesson objective content or other critical ideas from that day's material. However, given the fullness of a typical West Point day, only the best students seem to thoroughly adhere to this method. Thus, as educators we tend to issue homework, daily quizzes, or some other creative educational technique to assist with upholding the spirit of the Thayer Method (and perhaps the discipline of our cadets), in the hopes that our in-class discussions will be richer, our in-class practical exercises will go smoother, and our cadets will understand the material better. Ultimately, we want our cadets to simply "be better prepared" for class on a daily basis and to "perform better" overall in our courses.

Cadet preparedness, along with how preparedness is efficiently achieved, is tangentially addressed in this chapter; however, the chapter's primary focus is on the use of outside-of-class requirements, for example, homework, as it applies to course design. Regarding cadets performing better, we evaluate this outcome by assessing homework's impact on student performance on the TEE (a comprehensive final exam). As mentioned, time is precious at the academy, and the structure of out-of-class homework has varying payoffs. Research in this area indicates that there is a lack of agreement on the benefits of homework.[6] Across the three different course design techniques utilized, we will show that the type and quantity of out-of-class work issued or not issued does in fact have a statistically significant impact on TEE performance.

Case study overview

The course evaluated in this case study was EM384: Analytical Methods for Engineering Management. EM384 is a required course for all engineering management (EM) majors in DSE, typically taken by juniors in their fall semester. The course focuses on the application of deterministic and probabilistic models used by analysts to make engineering management decisions. Cadets learn to apply various modeling techniques to represent and solve real-world organizational problems in the military and industry. It is an introductory "tool-kit" course that teaches spreadsheet fundamentals, basics of data science, optimization and linear programming, decision analysis, and simulation. Most cadets find the course to be useful in preparation for their future coursework but occasionally reference it as one of the more challenging courses in the EM program because of its breadth of content.

The three pedagogical techniques explored in this case study were each one semester in length, were independent of each other, and occurred across three academic terms (AT): AT17–1, 18–1, and 19–1. Each technique varied the course design: changes were made to the outside-of-class requirements and the weighting of graded events. Everything else, including and most importantly the course content – what the cadets were asked to learn – and the TEE remained the same.

In the case study's first term, AT17–1, there were no outside-of-class evaluated assignments. Instead, there were six individual in-class major graded events. Some instructors believe that in-class assessments are the purest method for representing cadet performance and, more importantly, individual cadet understanding, and that this model forces

6 Thomas, Ann Hill, "Homework: How Effective? How Much To Assign? The Need For Clear Policies." *Oregon School Study Council* (September 1992): 41.

a "maturity" and ownership of one's grade and progression through the course that we should expect at the college level. At the end of the term, when asked "How would you improve this course?" however, cadet feedback overwhelmingly requested outside-of-class evaluation. Cadets seemed to desire accountability from their instructors to help them (or force them) to prepare for class: one cadet honestly remarked, "Add some graded homework to encourage students to do work outside of class. Currently there is no reason to prepare for class because the instructor will be teaching it anyways."[7] Cadets also seem to believe that required outside-of-class work would assist them in keeping up with the material: "This course needs more than 6 graded events. Include a project, instructor points, or extra credit opportunities so students can understand where they are at in the course before they are tested."[8]

After receiving feedback from AT17–1, many felt that AT17–1's method did not allow for accurate identification of a cadet's understanding of the material prior to a major graded event. Additionally, some felt that AT17–1 only catered to cadets who could perform well in time-constrained conditions. Changes in AT18–1, with numerous smaller homework assignments, sought to alleviate these concerns. In the case study's second term, AT18–1, 12.5% of the total course points were allocated specifically to outside-of-class work – however, at a very frequent and small point value. Approximately 24 small homework assignments were issued at the discretion of the instructor, typically one problem for each lesson's assignment, each with insignificant point value (~3 pts each) and graded with relative leniency for accuracy.

Feedback from AT18–1 indicated that many felt that there were too many homework assignments and the quality of submissions from students was poor. Additionally, and somewhat surprisingly, despite a significant percentage of AT18–1's course total, 12.5%, many cadets chose simply not to complete a large portion of the homework. Changes in AT19–1, the case study's final term, sought to alleviate some of these concerns, with only four large problem sets. In AT19–1, 22.5% of the total course points were now allocated to outside-of-class work; however, in this term, the assignments were issued infrequently and with significantly larger point value. In AT19–1, four major problem sets were assigned, one approximately every three weeks, and each valued between 5–7.5% of the course total. These four assignments were the only outside-of-class assignments.

Table 31.1 summarize these differences in outside-of-class assignments across the three academic terms:

Table 31.1 Overview of outside-of-class course design differences

	Academic Term:	*17–1*	*18–1*	*19–1*
Outside-of-Class Assignment Details	*% of Course Total*	None	12.50%	22.50%
	Format	None	Homework Problem	Problem Set
	Frequency of Occurrence	None	~ Every Lesson	Once Per Block
	Points Per Assignment	None	~ 3 pts each	3 × 50 pts, 1 × 75 pts
	Total Quantity in Term	None	24	4

7 EM384: Cadet End of Course Feedback 17–1 (December 2016).
8 EM384: Cadet End of Course Feedback 17–1 (December 2016).

Methodology

To assess the effectiveness of these pedagogical adjustments, data was collected on the cadets and their performance within the course. We collected data on the instructor, a cadet's Academic Performance Score Cumulative (APSC, a grade point average on a 4-point scale) going into the term, a cadet's average within the course prior to the TEE, and their performance on the TEE. The TEE is an important measure, because this cumulative exam accounts for 25% of the total course grade and remains relatively unchanged from year to year.

We hypothesized that if a pedagogical change made a significant difference on a cadet's learning, it would appear in this dependent variable. Upon initial investigation, it appeared that cadets had in fact improved their performance on the TEE from AT 17–1 to 18–1 to 19–1. As shown in the box-and-whisker plot in Figure 31.1, the average TEE score (illustrated by the horizontal black line) trends upwards across the three terms and is highest in term 19–1.

Understanding that this increase in performance could possibly be an artifact of increased capability of the cadets in these particular terms, we first explored the APSC of cadets going into the semester. This variable was chosen because it did not contain the effect of the course itself and stood to represent the overall average academic capability of a cadet. This variable was adjusted from a 4.0 scale to a 0–100 scale to more easily compare against test outcomes. For example, a 4.0 student would be rated as a 100 in this adjusted APSC term. When comparing the densities, it does appear that the cadets in 17–1 had a much heavier distribution in the 80% range (indicating a weaker group of students), with the cadets in 19–1 displaying a more drastic bimodal distribution (Figure 31.2). This difference in composition needed to be considered with any analysis of pedagogical outcomes.

Next, data on instructors was collected to ensure that individual differences between instructors was not responsible for the differences in student cadet performance on the TEE. Previous research in our department indicated that once APSC was controlled for,

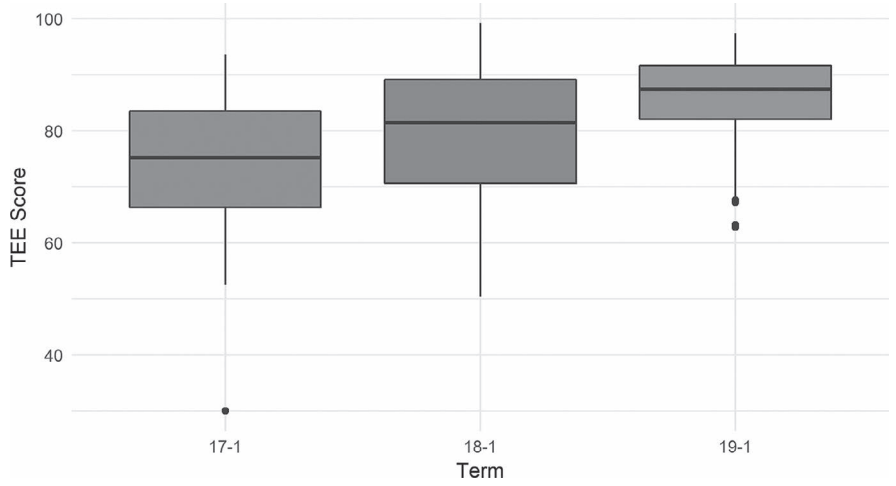


Figure 31.1 TEE score performance across terms.

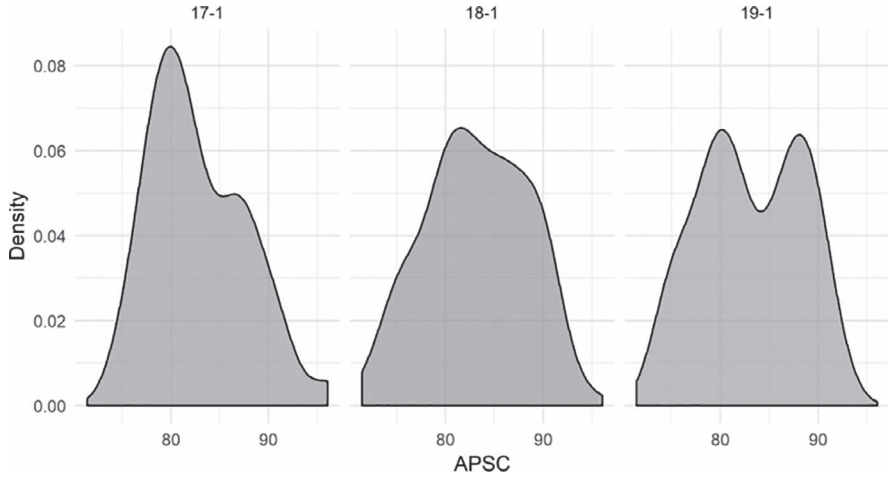


Figure 31.2 APSC distribution for each term.

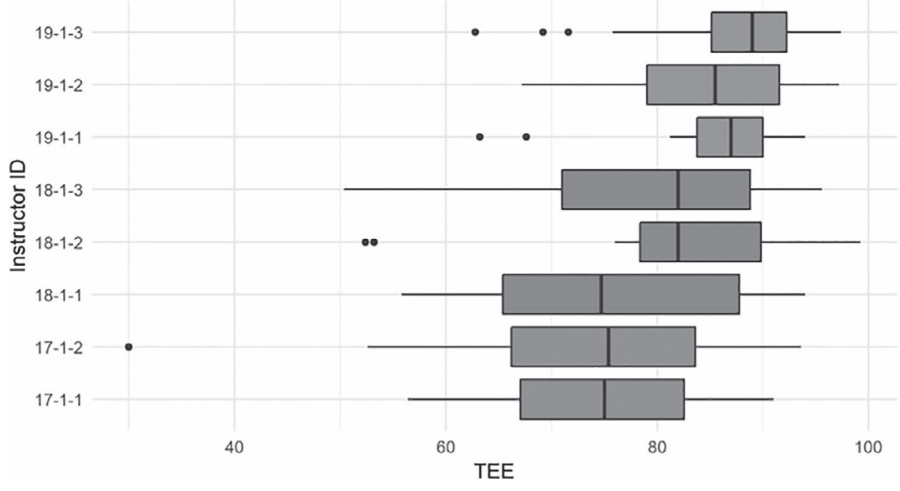


Figure 31.3 TEE performance by instructor for each term.

instructors had no significant effect on group performance on TEEs.[9] Figure 31.3 presents data for each of the different instructors for EM384 in each AT (two instructors in AT 17–1 and three each in 18–1 and 19–1). As Figure 31.3 shows, when the TEE data was scrutinized by individual instructor and term, we observed overlapping and tightly coupled distributions, again supporting the claim that the individual instructor, once other variables are controlled for, does not impact TEE scores. Perhaps not immediately

9 Caddell, John, and Daniel Newell, "Evaluating the Impact of Teachers at The United States Military Academy." *IEEE SYSCON*. Orlando (2019).

intuitive, this outcome occurs because instructors' abilities are reasonably comparable and courses tend to be executed in an extremely collaborative environment. Instructors liberally share presentations, in class exercises, and other methods employed in the classroom. Course directors and more experienced instructors often invite new instructors to observe lessons to help in their lesson preparation and refinement. In this type of environment, the differences in individual instructors fail to significantly impact a cadet's ability to perform in the classroom. The plot in Figure 31.3 represents the outcome of such an orchestrated teaching mechanism, with tightly overlapping TEE score distributions even without controlling for individual student abilities.

The same previous research also found that cadets in technical courses who struggled going into the TEE often performed worse than would have been expected based upon their past academic performance (APSC). The original hypothesis was that students might try and make up lost ground in a course by overpreparing and doing exceedingly well on the TEE, but the findings suggest that students that fall behind their benchmark (APSC) often continue to struggle. To help control for this phenomenon, the variable "gradeGap" was created and calculated by subtracting the cadet's average within the course prior to the TEE from the cadet's APSC.

A factor variable, Term, describes which academic term the cadet took their course. Inside of the statistical model, it acts as a binary variable – yielding a one for the appropriate term and zeros for all others. The factor has three levels (17–1, 18–1, and 19–1) and represents the different instructive approaches.

By controlling for the particular term when the course was taught (Term), the student's past academic performance (APSC), and gradeGap, we could now isolate and evaluate the specific impact the three pedagogical differences (no outside-of-class homework, frequent outside-of-class homework, and only four large problem sets) had on a student's performance on the term end exam. To accomplish this end, we formulated the linear regression model:

$$TEE \sim gradeGap + Term + APSC$$

Instructor could not be controlled for in this analysis because not all instructors taught in all terms. We did conduct an analysis of variance on these variables and instructors by term, however, and confirmed no statistical significance, which further supported the omission of the instructor variable.

Results

After controlling for the previously described variables of interest, we found that there was a significant difference between the three pedagogical offerings of outside-of-class work. The associated *p*-value for each of the independent variables surpasses the traditional 5% significance level. This indicates that the observed effect can be attributed to the examined variable instead of random chance. As seen in Table 31.2, the difference in TEE performance between Term 17–1 and 18–1 was over 5 points, while the difference between Term 17–1 and 19–1 was almost 9.5 points!

In other words, in comparison to Term 17–1, cadets who took EM384 in Term 18–1 would have seen half a letter grade improvement on their TEE performance, while cadets that took EM384 in Term 19–1 could expect to see almost an entire letter grade improvement (~9.5 points).

Table 31.2 Regression analysis on TEE performance (AT17–1, AT18–1, AT19–1)

Coefficients	*Estimate*	*Std. Error*	*t-value*	*p-value*
(*Intercept*)	−41.45060	7.76746	−5.336	2.21e−07
gradeGap	−0.54443	0.09412	−5.784	2.16e−08
Term18–1	5.02356	1.15571	4.327	2.01e−05
Term19–1	9.47522	1.20443	7.867	1.08e−13
APSC	1.39751	0.09327	14.984	<2e−16

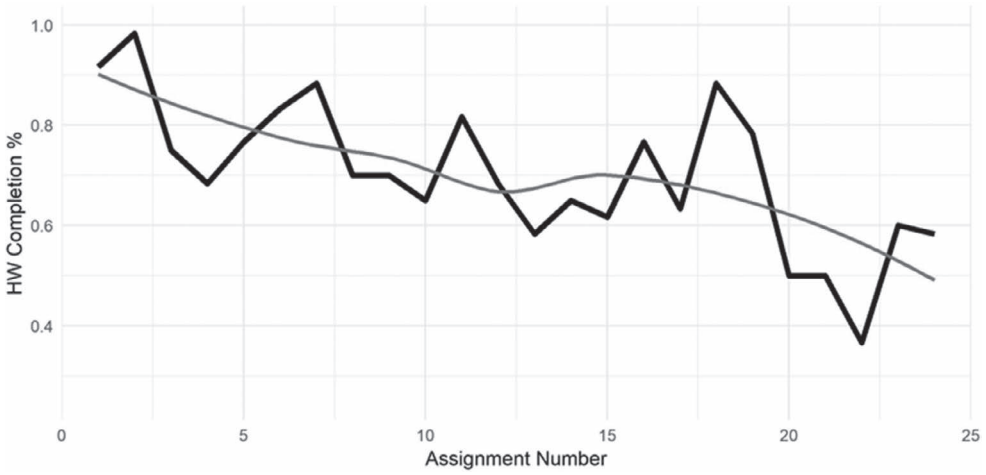


Figure 31.4 Homework completion % by assignment.

While a significant difference was expected from cursory exploratory data analysis, the magnitude of the coefficients was extremely surprising. In order to better understand this output, Term 18–1 was further investigated, with an added focus on the cadet's performance, specifically on homework.

The first thing that was apparent was that cadets did less of the homework than was initially expected. As seen in Figure 31.4, cadets generally did the homework assignments at the beginning of the semester but continued a steady decline in completion as the semester progressed. In general, it appears that cadets experience homework fatigue where the frequency and lack of significance of the homework creates a situation where cadets continually de-prioritize the event. Completion rates for the problem-sets, however, issued in Term 19–1, were consistently near 100%.

Due to the infrequent completion of homework, it was little surprise that cadet's marks on homework were low. During Term 18–1, 45% in the course had a failing average (< 65%) on their homework assignments, as shown by the black line in Figure 31.5.

We assumed that the cadets who completed homework assignments would naturally do better on the TEE. After investigating the data, we found no evidence to suggest this. When we graphically compared the cadet's homework average with their TEE grade, we found no clear relationship or pattern to suggest that doing the homework correlated to higher TEE grades (Figure 31.6).

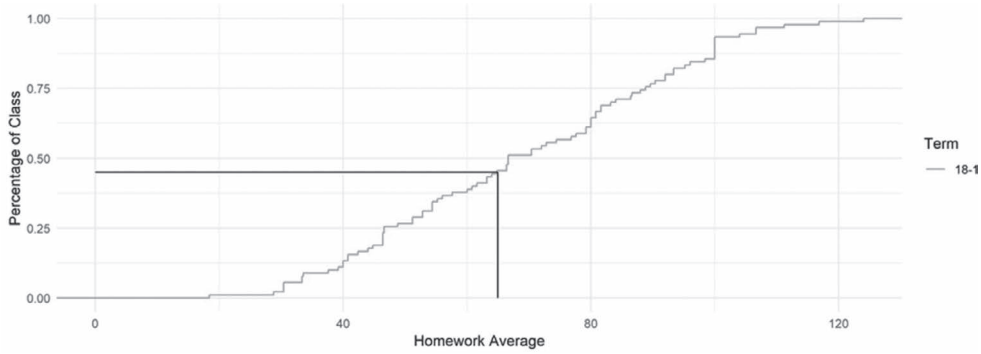


Figure 31.5 Homework average for AT18–1.

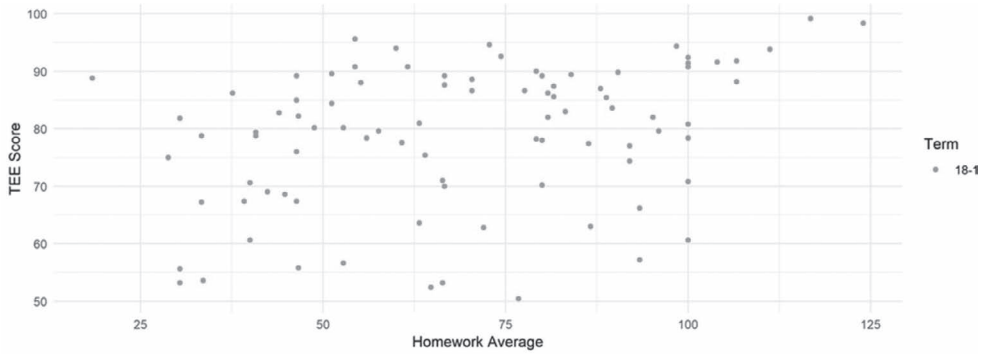


Figure 31.6 Homework average and TEE score for AT18–1.

Understanding that this could be masked by other variables, we ran an additional regression with only the 18–1 data to better understand this relationship. Controlling for APSC and gradeGap left us with the following regression formula:

$$TEE \sim gradeGap + HW_Average + APSC$$

Unsurprisingly, APSC and gradeGap remained statistically significant in this analysis, with matching directionality and similar magnitudes. Interestingly, HW_Average proved statistically significant, but with a slightly negative coefficient (see Table 31.3).

The directionality of the HW_Average variable intrigued us. How could doing your homework lead to lower performance on the TEE? After careful reflection, we understood that this was likely an artifact of highly efficient prioritization. In this last regression, the coefficient for APSC increased in magnitude from our base regression by almost 25% (1.76 vs. 1.40). This is significant because for every point increase in APSC, a cadet is expected to do almost 25% better than our original model. The negative HW_Average coefficient presents as such because some of the best students chose NOT to do the

Table 31.3 Regression analysis for AT18–1

Coefficients	*Estimate*	*Std. Error*	*t-value*	*p-value*
(*Intercept*)	−56.91358	14.26708	−3.989	0.00014***
APSC	1.75928	.18353	9.586	3.52e-15***
HW_Average	−0.13412	0.05551	−2.416	0.01784*
gradeGap	−0.81635	0.21809	−3.743	0.00033***

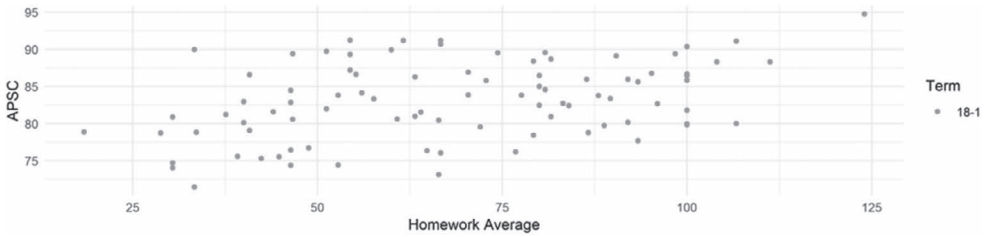


Figure 31.7 Homework average and APSC for AT18–1.

Table 31.4 Regression analysis for AT19–1

Coefficients	*Estimate*	*Std. Error*	*t-value*	*p-value*
(*Intercept*)	7.1280	9.8171	0.726	0.46983
APSC	1.0516	0.1319	7.973	7.35e-12***
PS_Average	−0.1125	0.1003	−1.122	0.26530
gradeGap	−0.4451	0.1374	−3.239	0.00172**

homework (Figure 31.7). While this surprised us at first, it makes sense that some of the above-average students routinely conducted a hasty analysis and determined that the effort required to complete the homework was insufficient relative to the impact on their course grade. These students opted to severely underperform, or fail, the homework assignments and make up for their grades on the larger, more point-intensive events.

When this dynamic is combined with the already loose correlation between a cadet's homework average and TEE, it should be unsurprising to see HW_Average's small and possibly negative impact on TEE grades. But this analysis begged the question, what is the impact of problem sets assigned in AT19–1?

Conducting a similar style of regression on the AT 19–1 data yielded the output found in Table 31.4. Perhaps unsurprisingly, a cadet's average on their problem sets (PS_Average) did not result in any statistical significance. This is because the model is already accounting for the cadet's inherent abilities and goals in the classroom with APSC. APSC retains the explanatory power within the model.

Another interesting factor discovered when comparing the 18–1 and 19–1 datasets was the condition under which cadets entered the TEE. It appears that the homework structure created additional variability within cadets' grades and primarily hurt cadets' course average prior to entering the TEE. As shown in Figure 31.8, cadet grades prior to the Term End Exam in 18–1 were lower on average and more dispersed than in 19–1.

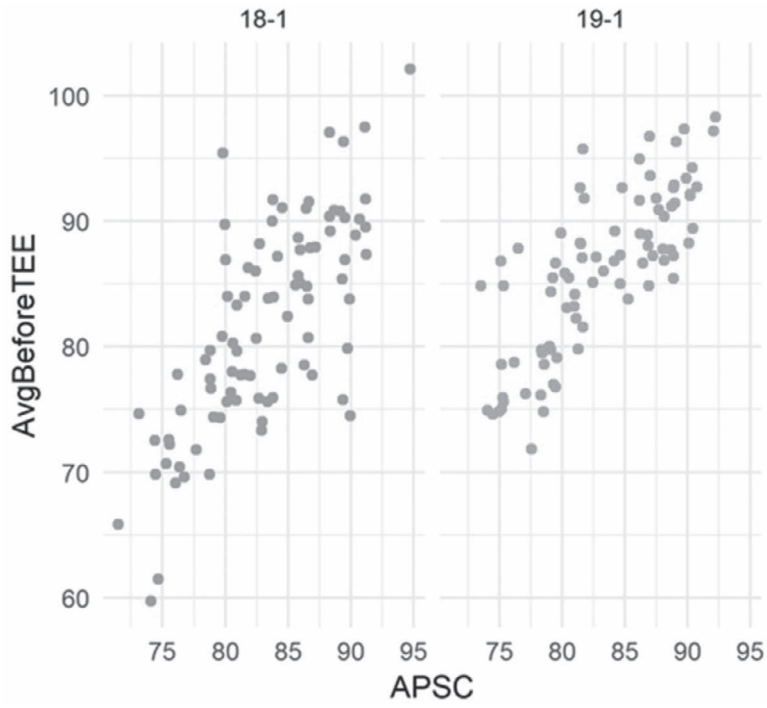


Figure 31.8 APSC and average before TEE for AT18–1 and AT19–1.

This suggests that not only did cadets who had a problem set-focused pedagogy peform better on the TEE, but they arrived to the TEE with a better course standing.

Findings and conclusions

From day one cadets learn from experience the basics of tradeoff analysis: what tasks must get their attention, for how long, and which ones can't or shouldn't be dealt with right now. One observer noted, "In order to survive at the academy, West Point cadets must develop an ability to zero in on what's *essential* and let the rest fall by the wayside."[10] As faculty members, we often struggle to accept this reality because we believe that preparation and work for *our* course is "essential" and should not fall by the wayside. It is helpful to remember, however, that the student ultimately is the one who decides where to focus his or her efforts.

Still, as faculty members, we can influence student behavior with effective use of outside-of-class requirements. In this study we have demonstrated that the structure of course design significantly matters. We have established that outside-of-class requirements do impact TEE performance and ostensibly learning within the course. Of the three pedagogical techniques evaluated, high frequency, low point-value homework is less

10 Brown, *Make It Stick*, 234.

effective than low frequency, high point-value problem sets. Having no outside-of-class requirements produces the worst outcomes. With frequent low point-value homework, completion percentage is low, and this model can hurt rather than help scores because cadet prioritization forces focus elsewhere. The use of problem sets, however, commands cadet attention and results in completion percentages near 100%. In conclusion, course directors should diligently contemplate the desired effect they want to achieve when assigning outside-of-class work. Within a fast-paced academic environment like USMA, problem sets are a dominant pedagogical technique when conducting course design.

32 Memory recall exercises

Food for thought

Michael B. Wright, Sean R. McMahon, Cole A. Spitzack, Dale J. Hommerding, and George J. Fust III

Introduction

A perennial challenge for students at any level is the retention, recall, and application of knowledge. One method consists of memory recall exercises, which involve short in-class writing exercises designed to activate students' memory of previously covered course material into the course of instruction. Since improved knowledge retention is a goal that any teacher seeks to achieve, testing the validity of memory recall exercises can provide valuable insights to teachers in any discipline.

Concepts discussed in the U.S. Military Academy's Master Teacher Program provided the inspiration for this study. In particular, two chapters from Peter C. Brown, Henry L. Roediger, and Mark McDaniel's *Make it Stick* provided our theoretical foundation. The chapter titled "To Learn, Retrieve" discusses positive aspects of repeated testing on students' ability to retrieve information. Brown, Roediger, and McDaniel highlight how "positive effects of repeated testing has been demonstrated many times in controlled laboratory settings, but rarely in a regular classroom setting."[1] Furthermore, the *Make it Stick* chapter titled "Embrace Difficulties" discusses positive benefits associated with difficult learning methods on subjects' ability to retrieve information at a later date.[2]

Our study sought to test the validity of these concepts. Over the course of an academic semester, we conducted an experiment to test the effects of memory recall exercises on student retention. Throughout the semester, we incorporated several short memory recall exercises as part of a college-level sophomore American politics survey course and measured the effects these exercises had on student long-term retention, as measured by their performance on the final exam. In addition to testing the effects of such exercises on long-term retention, we also sought to test Brown and Roediger's theories regarding the consequences of repeated testing and the effects of "desirable" difficulties on student performance.[3]

We found no evidence that our exercises had a positive effect on student knowledge retention. In fact, our results indicate that, to the degree that such exercises have an effect, that effect is negative. To our knowledge, this is the first experimental evidence that tests the effects of memory recall exercises at the college level, and our findings suggest that such exercises may not be an effective tool for improving long-term knowledge retention.

1 Peter C. Brown, Henry L. Roediger, and Mark A. McDaniel, *Make it Stick: The Science of Successful Learning* (Cambridge, MA: Harvard University Press, 2014), 33.

2 Brown, Roediger, and McDaniel, 75–79.

3 Brown, Roediger, and McDaniel, 235–241.

Literature review

The idea that there are benefits to testing memory is not new. Sir Francis Bacon's recognition in 1620 that "if you read a piece of text through twenty times, you will not learn it by heart so easily as if you read it ten times while attempting to recite from time to time and consulting the text when your memory fails."[4] Modern researchers have devoted significant attention to assessing techniques meant to improve students' ability to recall information. Experiments have tested retention through direct methods such as recall and recognition exercises.[5] In free-recall tests, individuals are asked to recall previously presented information, such as recalling a list of words or objects from memory.[6] Recognition tests typically provide a list of possible choices for subjects to reference. One common area of focus when studying retention is the testing effect, otherwise known as the retrieval-practice effect, which states that "practicing retrieval makes learning stick far better than re-exposure to the original material."[7] While the ideas behind testing memory to improve recollection date back centuries, precise methods for improving memory through repeated testing are often either narrowly focused or yield inconclusive results.

Multiple scholars have conducted experiments related to the testing effect with mixed results. Phillip Ballard pioneered experiments in 1913 showing an increase in children's ability to recall poetry passages through testing. Ballard concluded that testing yields positive effects such as reminiscence, where individuals recall material on future tests that was not recalled on previous tests.[8] In 1974, Erdelyi and Becker expanded on Ballard's research by testing subjects' ability to recall large sets of words or pictures. Their experiments provided evidence of memory improvements that they labeled as hypermnesia, where individuals recalled material on subsequent tests that they could not recall on previous tests.[9] Research by Henry Roediger and Jeffrey Karpicke suggest the process of test taking yields greater positive results than an equivalent time spent studying "even when performance on the test is far from perfect and no feedback is given on missed information."[10] Collectively, prior research provides a foundation for the positive correlations between increased testing and student performance.

However, other experiments lead to drastically different conclusions and suggest potentially negative impacts from repeated testing. Frederick C. Bartlett's experiments reveal an increase in forgetting and information distortion in subsequent tests after subjects learned prose passages and were tested both immediately following (15 minutes after studying) and later (within a week of learning the passage).[11] Bartlett noticed that student performance

4 Francis Bacon, *Novum Organum*, trans. Lisa Jardine and Michael Silverthorne (Cambridge, England: Cambridge University Press, 2000), 646.

5 Stewart H. Hulse, James Deese, and Howard Egeth, *The Psychology of Learning* (New York: McGraw-Hill, 1975), 346.

6 Hulse, Deese, and Egeth, 346.

7 Peter C. Brown, Henry L. Roediger, and Mark A. McDaniel, *Make it Stick: The Science of Successful Learning* (Cambridge, MA: Harvard University Press, 2014), 28.

8 Phillip B. Ballard, "Oblivescence and Reminiscence," *British Journal of Psychology Monograph Supplements* 1 (1932), 1–82.

9 Matthew Erdelyi and J. Becker, "Hypermnesia for Pictures: Incremental Memory for Pictures but not for Words in Multiple Recall Trials," *Cognitive Psychology* 6 (1974), 159–171.

10 Henry L. Roediger and Jeffrey D. Karpicke, "The Power of Testing Memory: Basic Research and Implications for Educational Practice," *Perspectives on Psychological Science* 1, No. 3 (September 2006), 181.

11 Mark A. Wheeler and Henry L. Roediger, "Disparate Effects of Repeated Testing: Reconstructing Ballard's (1913) and Bartlett's (1932) Results," *Psychological Science* 3, (July 1992), 240–245.

declined over time as his research subjects forgot portions of the passages but often recreated details of the story based on their own perceptions.[12] This suggests an aspect of contamination resulting from inaccurate information learned during previous tests.[13] James Deese also cautions against the use of repeated testing due to information contamination. Deese notes that repeated testing "yields very impure measures of retention after the first test, since all subsequent measures are contaminated by the practice the first test allows."[14] As opposed to previous conclusions highlighting testing's ability to facilitate learning through reminiscence and hypermnesia, Deese highlights negative aspects of learning through testing due to contamination. Research highlighting reduced performance from repeated testing combined with the contamination effect contributes to a broader area of study into forgetting.

In addition to contamination, other significant theories related to memory recall have been posited. Stuart Hulse and Howard Egeth discuss interference theory, which is significant to the study of forgetting. Interference theory examines the relationship between a specific stimulus and a specific response (S-R). Hulse and Egeth suggest that providing more frequent stimuli, mostly through increased testing, may have positive or negative effects on student performance.[15] Evidence suggests that once a specific "S-R connection is established, it is not weakened by the passage of time; however, S-R associations interact with one another, producing behavioral changes that may be either facilitatory or inhibitory."[16] Additionally, a 2012 study by P. K. Agarwal, et. al. offers compelling evidence that interference theory is at play in middle school settings.[17] This five-year study provides the benchmark for our experiment at the undergraduate level.

By creating additional stimuli through testing, one can expect to see a range of either positive or negative responses. For example, while testing could potentially provide a facilitatory benefit through hypermnesia, further stimulus-response interactions may inhibit recall by introducing information contamination. Accordingly, interference theory provides a framework for future experiments to examine the correlation between testing and retention.

Even though significant prior research has been undertaken in examining impacts of the testing effect, the preponderance of tests focused on simple free-recall tests, such as recalling details from a prose passage, poetry verse, or list of names or images. This chapter expands on existing research on the testing effect to observe the impacts of memory recall exercises on student performance for more complex and diverse topics from a core-level American politics course.

Methodology

Our research examines the effect of memory recall exercises on student learning. We use similar methods as previous authors but test more complex cognitive functions among college students rather than simplistic tasks among primary education students. Our

12 Wheeler and Roediger, 240.

13 Ibid.

14 James Deese, *The Psychology of Learning* (New York, McGraw-Hill, 1958), 237–238.

15 Hulse, Deese, and Egeth, 340.

16 Ibid.

17 P. K. Agarwal, P. M. Bain, and R. W. Chamberlain, "The Value of Applied Research: Retrieval Practice Improves Classroom Learning and Recommendations From a Teacher, a Principal, and a Scientist." *Educational Psychology Review* 24 (2012), 437–448.

research utilized a series of in-class memory recall exercises targeting major course concepts. The study included 29 sections of USMA's mandatory, 200-level American Politics course. Ten instructors and 321 students participated in the project. Sections were randomly assigned to one of three groups; two treatment groups and a control group. Students were blocked by class section so that all students in a given section were assigned to the same control or treatment group. Instructors who taught multiple sections had their sections randomly assigned, while ensuring each instructor had at least one control section. During grading, individual instructors mixed exams from their respective treatment and control sections to prevent grading bias toward any one group.

Memory recall exercises entailed providing students a short prompt asking them to write everything they could recall about a specific topic previously covered in the course. Students were allowed ten minutes at the beginning of class to complete the ungraded exercise. Five exercises were completed at roughly even intervals throughout the course, with each exercise covering a different aspect of course material relevant to a subsequent graded exam.

We created two treatment groups to examine impacts of repeated testing and potential contamination on student performance. Students assigned to the first treatment group, *Treatment (No Notes)*, were required to complete the exercise without referencing their course notes or readings. The second group, *Treatment (Notes)*, were allowed to reference their course notes and readings. We measured treatment effects by comparing students' overall course grades. We also recorded student performance on individual exam questions directly correlated to questions posed in the exercise prompts to offer further insights into how memory recall exercises impact final course grades.

Our study assessed student performance across the two treatment groups to test whether the inability to reference class notes during the exercise contributed to greater learning endurance by making learning more difficult. Here we hypothesize that students not referencing notes or course readings would be more likely to retain course concepts due to being forced to recall information from memory rather than by simply regurgitating notes. This type of recall should be more difficult and therefore more likely to promote later retrieval.

Finally, we conducted an end of course survey to glean students' feedback about the exercises. Surveys centered around four statements pertaining to students' perception of the memory recall exercises' effects. Students were asked to what extent they agreed or disagreed with statements indicating the exercises improved their performance on subsequent exams, improved their overall understanding of course concepts, helped focus their exam preparation efforts, and prompted students to review course material outside of class. Surveys employed a five-point Likert scale for which 1 represented disagreement with the statement and 5 represented significant agreement. An answer indicating agreement with the statement corresponds with the student perceiving the memory recall exercises contributed positively in some way.

Expected results

We expected students who were assigned to either treatment group to exhibit a greater ability to retrieve and apply information as measured by stronger performance in the course. These students should benefit from the opportunity to practice retrieval of course material through the memory retrieval exercises. We hypothesize that exposure to more retrieval opportunities will result in a greater ability to retain and apply course concepts. Additionally, we expect students who were *not* allowed to reference course notes and

other materials to perform better than those who were allowed to access notes. We believe the greater difficulty associated with recalling information from memory (rather than from referenced class notes) will lead to a greater ability to recall information later.

Results

Students who were given the memory recall exercises did not demonstrate improved course performance, as measured by both final course grades and all exam grades. This is true of students in both treatment groups. A difference of means test found no significant difference between the control and either treatment group. The magnitude of the difference between means was also not substantial. Therefore, upon initial analysis, these results suggest that the memory recall exercises had no effect on student performance. However, given our access to extensive data on the students and the complexity of the variables involved, we sought to leverage other empirical methods and control for other effects. We controlled for idiosyncrasies associated with different class hours, instructors, student GPA, and different versions of the final exam on student performance by conducting ordinary least squares (OLS) regressions.

Unsurprisingly, we found that student GPA is the overwhelmingly dominant explanatory variable. Table 32.1 displays the results of a simple OLS regression. The results show a highly significant impact of a 7% increase in final grades for every 1 point higher GPA the student previously earned. In other words, students with a 3.5 GPA earned a 7% higher grade on their final exam than students with a 2.5 GPA. We also found that the version of the final exam students took had a significant impact of 1.1% on final grades. Controlling for these fixed effects, as well as anticipated differences between different class hours and instructors, validated our initial finding of no impact for those who received the *Treatment (No Notes)*. However, the *Treatment (Notes)* group performed lower (−1.4%) on final grades. This result suggests that students who conducted the memory recall exercises with access to their notes performed worse, not better, than students who conducted the exercises without notes or did not conduct the exercises at all.

Table 32.1 Results

Final Grade	
Treatment (No Notes)	−0.00193 (0.00681)
Treatment (Notes)	−0.0143⋆ (0.00733)
Final Exam Version	0.0111⋆ (0.00566)
GPA	0.0712⋆⋆⋆ (0.00382)
Class Hour FE	Yes
Instructor FE _ constants	Yes 0.645⋆⋆⋆ (0.0268)
N	321

Standard errors in parentheses

⋆$p < 0.1$, ⋆⋆ $p < 0.05$, ⋆⋆⋆ $p < 0.001$

Findings and discussion

Our results yielded no significant findings to support the premise that interrupting forgetting *improves* student performance in a classroom environment using memory recall exercises. Most results indicated that the exercises had no effect. Moreover, in one model the memory recall exercises had a *negative* effect on student performance in the group that had access to their notes and course readings during the exercises. This outcome could be attributable to several factors.

First, the intervals between applicable lessons, memory recall exercises, and subsequent exams may have been inappropriate for achieving the desired effect. Second, we did not use any feedback mechanisms with the exercises. Providing feedback may have improved the effectiveness of the exercise.[18] Conducting the exercise without reference to the correct answer may have had the unintended "contamination" effect of reinforcing the student's "benchmarked" wrong answer.[19] Third, the structure of the exercise could have been suboptimal for improving retention of the targeted topics. For instance, selecting different topics for the exercise or interrupting forgetting through different methods (e.g., oral recall, etc.) may have changed retention outcomes.

Our survey results (see Appendix B) revealed several discontinuities between the measured effect of the recall exercises and the students' perception of the exercise's effect on performance. First, student self-perception is that the exercise improved their performance (see Appendix B). Although in reality this was not the case, this suggests that the exercise itself may have a positive effect beyond the scope of this study, such as on general student interest in the topic.

The second useful finding from our survey regarding student self-perception is that the exercise had no effect on their motivation to study out of class (see Appendix B). This is informative, although out-of-class motivation was not the primary goal of the activity. It suggests that requiring students to access previously learned material did not have a noticeable effect on their study habits.

Taken together, these results provide several useful observations. First, instructors should be aware of the discrepancy between the student's perceived benefit from the exercise, which was perceived as high, and the actual measured effect on performance, which was negligible. This potentially has both positive and negative effects on student learning beyond the exercise's intended effects. On one hand, similar exercises could be used to facilitate student comfort with the material and improve their confidence in the classroom. On the other hand, this can be detrimental to learning outcomes if such an effect leads to overconfidence. The second useful observation for instructors is the unintended "contamination" effect that can result from lack of feedback. This means that providing feedback on student responses may be valuable to prevent students from "benchmarking" to incorrect understandings of concepts.

Conclusions and future research

We found no evidence that written memory recall exercises improved long-term knowledge retention based on a semester-long experiment in an undergraduate-level survey course. Additionally, we found evidence that, under certain conditions, such exercises

18 Brown, Roediger, and McDaniel, 235–241.

19 Argawal, Bain, and Chamberlain.

may reduce student performance and long-term retention. This suggests that instructors may want to consider alternative methods for improving student retention.

Although insightful, our study leaves open the possibility for future research in several areas. Based on our survey results, one area of focus concerns the role of instructor feedback in improving knowledge retention. Many students indicated on end-of-course surveys that they thought the exercises were helpful; however, they believed they would be even more so if the students had received instructor feedback, either individually or as a group through in-class discussion. It is uncertain whether feedback would have produced different results. Scholarship on negative "benchmarking" effects that occur in the absence of feedback suggests that providing feedback in conjunction with the retrieval exercises could have improved knowledge retention. With minimal effort, this study could be replicated to include a variety of instructor feedback approaches to evaluate potential effects.

A second area for future research concerns the level of specificity that the recall exercise targets and its influence on overall learning outcomes. The exercises conducted in our study focused on retrieving knowledge on specific topics about one political actor per exercise (in a course that surveyed a variety of political actors). However, existing scholarship suggests that long-term retention can be improved by "interleaving" multiple concepts within a single exercise.[20] Therefore, it may be beneficial to replicate this experiment with varied levels of specificity.

Another consideration for future analysis on memory recall should leverage technology. Exercises could be required outside of class using a digital platform that may increase student contact with course content and better enable instructor feedback.

Finally, it may be that this study's findings are influenced by the nuances inherent to the study of American politics or to USMA's unique learning environment and/or student population. Therefore, our findings should be tested across academic disciplines and in civilian undergraduate institutions before judging our findings' generalizability.

While we acknowledge memory recall for content-based courses is ultimately dependent on student effort, pedagogical techniques can be leveraged to affect outcomes in the aggregate. Instructor techniques and course design do play a critical role in memory recall. Future experiments can further clarify the relationship of memory recall exercises to student performance.

20 Brown, Roediger, and McDaniel, 47–50.

Appendix A

Memory recall exercise prompts

Memory recall exercise I

Write down everything you know about Thomas Hobbes and John Locke. Some things you might consider include who these men were, what ideas they had about human nature and government, and how they influenced our society and government today. Anything else you think relevant.

Memory recall exercise II

Write down everything you know about Congress. Some things you might consider include: What formal powers are granted to Congress in the Constitution? How might Congress check or influence the actions of the other branches of government? What motivates members of Congress? How do members of Congress conceive of their constituencies? What are some ways Congress can ensure executive agencies implement/enforce laws according to Congress's intent? Anything else you remember.

Memory recall exercise III

Write down everything you know about the presidency. Some things you might consider include: What are the president's formal powers enumerated in the Constitution? What are the president's implied or informal powers? How might the president check the actions of the other branches of government? How might he otherwise influence them? How might the president exercise control over the bureaucracy?

Memory recall exercise IV

Write down everything you know about the interest groups. Some things you might consider include: What role do interest groups play in the policymaking process? What benefits do interest groups provide to members of government? What are inside and outside lobbying strategies, and under what circumstances might one type of strategy be preferred over the other? How do interest groups solve the collective action problem?

Memory recall exercise V

Write down everything you know about political parties. Some things you might consider include: What roles do political parties play in the American political system? What roles do political parties play in the policymaking process? Describe political parties as organizations. How do they relate to the electorate? How do political parties reduce the cost of voting? Why do there tend to be only two major political parties in the United States? Anything else you can think of!

Appendix B

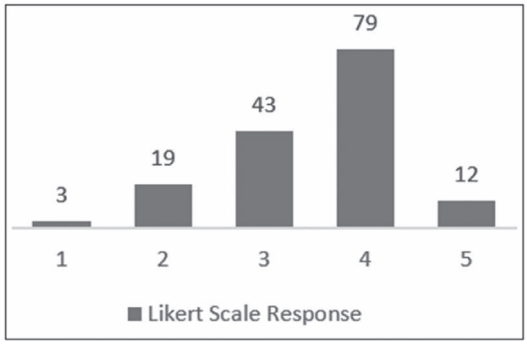
End-of-course survey with results

Instructor Name_____ **Section**_____

1

In-class writing exercises helped improve my performance on later exams?

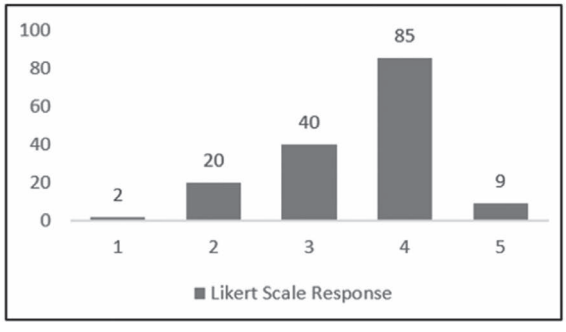
Strongly Disagree | Disagree | Neutral | Agree | Strongly Agree



2

In-class writing exercises helped me better understand course concepts?

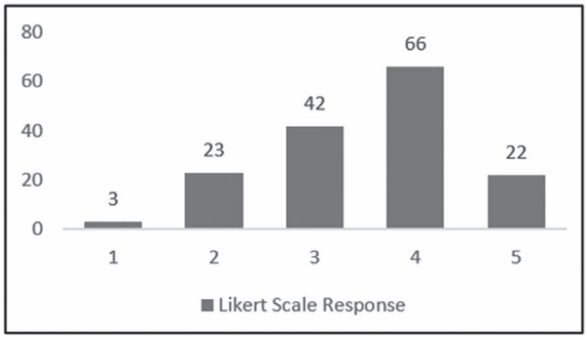
Strongly Disagree | Disagree | Neutral | Agree | Strongly Agree



3

In-class writing exercises prompted me to focus my exam preparation on the topics covered in the in-class exercises *more than I would have* had I NOT seen those topics on the in-class activities?

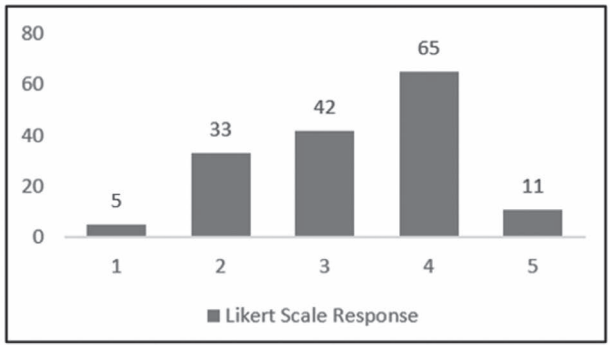
Strongly Disagree | Disagree | Neutral | Agree | Strongly Agree



4

In-class writing exercises prompted me to review course-related topics outside of class.

Strongly Disagree | Disagree | Neutral | Agree | Strongly Agree



Interdisciplinary articles

Rachel M. Sondheimer

This section features three articles written across multiple disciplines. The first work highlights the benefits of collaborating across disciplines to provide learning opportunities for students, in this case on understanding microbiomes. The second two articles showcase how different disciplines can use similar methods and technology to enhance teaching within specific fields. Taken together, these works emphasize the value of cross-collaboration in content and sharing of best practices in teaching methods.

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33 An interdisciplinary approach to student understanding of microbial diversity

You are what you touch

Melissa Eslinger, Ryan E. Rodriguez, and Elizabeth Mentis

Introduction

Authentic undergraduate research opportunities enhance the application of coursework and critical thinking skills. Microbiome analysis is one area of interest to the scientific community and where students can concurrently study the implications while participating in its characterization. Much of the undergraduate student population spends quite a bit of its time within enclosed spaces. However, students at the U.S. Military Academy combine indoor and outdoor activities in academic, physical, and military settings. During these transitions they encounter a variety of microorganisms, some of which are pathogenic, but the majority commensal. For our population, we focus on opportunities to bridge two cohorts, one enrolled in an undergraduate introductory biology course for nonscience majors and the second group being science majors enrolled within independent research.

Every West Point student is required to take a minimum of three science courses. This includes one semester of general chemistry, one semester of physics, and a third semester of science that can be either chemistry II, physics II, or biology. On average, 520 cadets per year elect introduction to biology as their third science course. These students, primarily humanities majors or those otherwise not required to take the second semester of chemistry or physics, are often in the final science course of their academic careers. Following the prerequisite general chemistry course, introductory biology is not designed for science majors or those with premedical aspirations; they enroll in a separate advanced biology course. We sought to actively engage the introductory biology students with a project to gain familiarity and exposure to the microscopic world but also promote interaction and competencies within peers, independent research students who are science majors.

The core competencies in biology education emphasize applications of science, interdisciplinary modeling, and scientific communication.[1,2] An evolving method to develop these competencies is through a course-based undergraduate research experience (CURE). CUREs, while variable in content and approach, promote the application and synthesis of increased knowledge along with improved analytical and collaborative skills.[3]

1 American Association for the Advancement of Science (AAAS). 2011. "Vision and Change in Undergraduate Biology Education: A Call to Action." A Summary of Recommendations Made at a National Conference Organized by the American Association for the Advancement of Science, Washington, DC. Available from http://visionandchange.org/files/2013/11/aaas-VISchange-web1113.pdf.

2 Batzli, J, and T Long. 2010. "Assessment gradient." Vision and Change: A Call to Action, by American Association for the Advancement of Science, 24. Washington, DC: National Science Foundation.

3 Corwin, L, M Graham, and E Dolan. 2015. "Modeling course-based undergraduate research experiences: An agenda for future research and evaluation." *CBE-Life Sciences Education* 14: 1–13.

Students using CUREs have achieved gains in technical skills and the scientific process similar to students involved in research internships.[4,5] Inquiry or model-based learning[6,7] or authentic research[8,9] tend to improve overall biological comprehension. With this in mind, we endeavored to generate a CURE for biology[10] to augment our liberal arts curriculum and enhance microbiology skills through a practical application of the scientific method.

An overarching goal of our biology curriculum is to cultivate leaders skilled in critical analysis who can solve ill-defined problems. In support of this goal, we strive to incorporate applications and models of course material that migrate beyond cursory depth of explanation in didactic learning. CUREs are activities that integrate learning into these types of models to meet course objectives. Educational literature provides several examples of projects designed to meet these objectives and discusses the benefits of group work when solving complex or open-ended problems[11,12] with increased student motivation and gains[13] when the problem is relevant to their lives outside the classroom.[14] We considered the CURE literature of probable outcomes and wanted to increase awareness of the importance of teamwork and analytical skills[15,16,17] while promoting faculty interaction.[18,19] Using an analytical and technically specific approach, a recommendation

4 Jordan, T, S Burnett, S. Carson, S Caruso, K Clase, R DeJong, J Dennehy, et al. 2014. "A broadly implementable research couse in page discovery and genomics for first-year undergraduate students." *MBio* e01051-13.

5 Lopatto, D. 2008. "Undergraduate research experiences support science career decisions and active learning." *CBE Life Science Education* 6: 297–306.

6 Buckley, B. 2000. "Interactive multi-media and model-based learning in biology." *International Journal of Science Education* 22: 895–935.

7 Ebert-May, D, C Brewer, and S Allred. 1997. "Innovation in large lectures-teaching for active learning." *Bioscience* 47: 601–607.

8 Dymond, J, L Scheifele, S Richardson, P Lee, S Chandrasegaran, J Bader, and J Boeke. 2009. "Teaching synthetic biology, bioinformatics, and engineering to undergraduates: The interdisciplinary build-a-genome course." *Genetics* 13–21.

9 Bednarski, A, S Elgin, and H Pakrasi. 2005. "An inquiry into protein structure and genetic disease: Introducing undergraduates to bioinformatics in a large introductory course." *Cell Biology Education* 4: 207–220.

10 Eslinger, M, E Kent, and E Mentis. 2018. "CURE biology: Analyzing microbes using a collaborative STEM approach." *STEM/STEAM & Education*. Honolulu.

11 Wilson, K, P Brickman, and C Brame. 2018. "Group work: Evidence-based teaching guides." *CBE–Life Sciences Education* 17:fe1: 1–5.

12 Ross, A, K Muller, J Weese, and J Neufeld. 2018. "Comprehensive skin microbiome analysis reveals the uniqueness of human skin and evidence for phylosymbiosis within the class Mammalia." *PNAS* 1–10. Available from www.pnas.org/cgi/doi/10.1073/pnas.1801302115.

13 Kirschner, F, F Paas, and P Kirschner. 2011. "Task complexity as a driver for collaborative learning efficiency: The collective working-memory effect." *Applied Cognitive Psychology* 25 (4): 615–624.

14 Schmidt, H, J Rotgans, and E Yew. 2011. "The process of problem-based learning: What works and why." *Medical Education* 45: 792–806.

15 Shaffer, C, C Alvarez, C Bailey, D Barnard, S Bhalla, C Chandreasekaran, V Chandrasekaran, et al. 2010. "The Genomics Education Partnership: successful integration of research into laboratory classes at a diverse group of undergraduate institutions." *CBE Life Science Education* 9: 55–69.

16 Shaffer, C, C Alvarez, A Bednarski, D Dunbar, A Goodman, C Reinke, A Rosenwald, et al. 2014. "A course-based research experience: how benefits change with increased investment in instructional time." *CBE Life Science Education* 111–130.

17 Bascom-Slack, C, A Arnold, and S Strobel. 2012. "Student-directed discovery of the plant microbiome and its products." *Science* 338: 485–486.

18 Hanauer, D, and E Dolan. 2014. "The project ownership survey: measuring difference in scientific inquiry experiences." *CBE Life Science Education* 13: 149–158.

19 Hanauer, D, J Frederick, B Fotinakes, and S Strobel. 2012. "Linguistic analysis of project ownership for undergradate research experiences." *CBE Life Science Education* 378–385.

of previous CURE-related authors,[20] we realized the potential for student authorship by characterizing the microbial diversity of our campus.

Previous studies have explored bacterial diversity within the classroom[21] or during air travel.[22] These and others[23] use 16S rRNA identification requiring DNA extraction, polymerase chain reaction (PCR) amplification, and sequencing. These are very time and resource intensive. We adapted a complementary alternative following colony isolation of environmentally obtained samples using the Shimadzu iD^{Plus} system[24] on the MALDI-TOF-MS (Matrix-Assisted Laser Desorption/Ionization-Time-of-Flight-Mass Spectrometry) platform with spectral identification against the SARAMIS (Spectral Archive And Microbial Identification System)[25] database. This research-grade instrumentation provides practical experience for students to address the realistic question, what microbes do I encounter at West Point? Pedagogically speaking, this promotes the transition from consumers of knowledge or technicians processing samples toward integration of technology to address a specific question while assimilating information in a meaningful way. This is precisely how students can practice aggregating data and synthesizing it to contribute to the scientific community, suggesting a progression of higher-order thinking skills. We introduce an experimental approach to science education where students apply content from multiple disciplines, particularly biology, chemistry, and mathematics, to interpret and summarize their findings and communicate results. The piloted results of this approach suggest that the curiosity of the nonscience majors to sample items from their daily lives, their engagements with sample processing and analysis, and the coupling of species identification by research students present a mechanism to bridge these student populations in the pursuit of a realistic question. After all, if we are what we touch, how do we differ?

Methods

Student population

Our students encompassed 250–300 nonscience majors and 5–7 science majors enrolled in an independent research course. The nonscience majors were part of the introductory biology cohort, mostly second-year students, all of whom had completed one semester of general chemistry. The introductory students were responsible for collecting samples from across campus. These students were responsible for the initial sample plating (with and without ampicillin containing media) and incubation, whereupon they made general quantitative and morphological observations regarding sample growth. From here,

20 Drew, J, and E Triplett. 2008. "Whole genome sequencing in the undergraduate classroom: outcomes and lessons from a pilot course." *Journal of Microbiology and Biology Education* 9: 3–11.

21 Meadow, J, A Altrichter, S Kembel, M Moriyama, T O'Connor, A Womack, G Brown, J Green, B Bohannan. 2014. "Bacterial communities on classroom surfaces vary with human contact." *Microbiome* 2 (7).

22 Weiss, H, V Hertzbers, C Dupont, J Espinoza, S Levy, K Nelson, and S Norris. 2018. "The Airplane Cabin Microbiome." *Environmental Microbiology*. doi:10.1007/s00248-018-1191-3.

23 Ross, A, K Muller, J Weese, and J Neufeld. 2018. "Comprehensive skin microbiome analysis reveals the uniqueness of human skin and evidence for phylosymbiosis within the class Mammalia." *PNAS* 1–10. Available from www.pnas.org/cgi/doi/10.1073/pnas.1801302115

24 *iD Plus MALDI-TOF Platform*. Available from www.ssi.shimadzu.com/products/maldi-tof-mass-spectrometry/id-plus.html

25 Cao, Yan, Lei Wang, Ping Ma, Wenting Fan, Bing Gu, and Ju Shaoqing. 2018. "Accuracy of matrix-assisted laser desorption ionization-time of flight mass spectrometry for identification of mycobacteria: A systematic review and meta-analysis." *Scientific Reports* (8).

samples were provided to independent research students, life science and chemistry majors, for additional sub-culturing and preparation of isolates for identification. These students had completed a combination of advanced biology and quantitative or analytical chemistry training. Also, research students closely worked in parallel with faculty and their independent research advisor.

Student prerequisites

Prior to this study, the nonscience majors had a basic understanding of prokaryotic and eukaryotic organisms along with laboratory familiarization with microscopy and species diversity. Standard safety guidelines were followed to include the wear of safety glasses, lab coats, and gloves at all times when working with the samples in the laboratory. ASM guidelines[26] indicate that BSL1 is suitable for plating environmental samples so long as they are sealed and observed unopened. However, any manipulation or sub-culturing must be accomplished within a BSL2 laboratory with students trained in the safe use and handling of potentially pathogenic microorganisms. Thus, subsequent colony isolation and identification were conducted by science majors and those enrolled in research courses, in coordination with faculty oversight.

Sample collection and preparation

Students were provided a sterile sample pack to take to three sampling locations (Figure 33.1). Sample packs consisted of a Ziploc bag with three Eppendorf tubes containing pre-aliquoted sterile growth media and sterile swabs. For dry surface samples, students dipped swabs in the growth media to moisten prior to swabbing their surface. The tip of the swab was then broken off and remained in the Eppendorf with the lid closed tightly. Samples were returned to the lab for plating 24–48 hours post-sampling to allow for microbial growth. Students annotated the date/time of sampling along with conditions

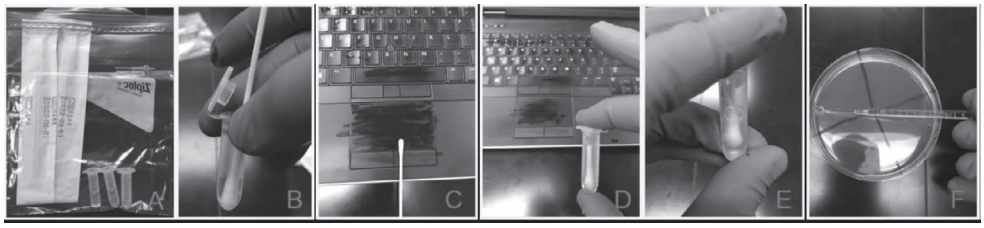

Figure 33.1 Specimen collection. (A) Students were provided sterile swabs and three Eppendorf tubes containing sterile growth media. (B) Prior to swabbing any dry sample sites, students were instructed to moisten their swabs with the growth media to facilitate specimen collection. (C) Representative swab and sample collection from a laptop space bar and trackpad. (D) After sample collection, the swab was placed into the same media for storage and transport back to the laboratory. (E) Students dipped an inoculating loop into their samples prior to plating on nutrient agar. (F) Sterile inoculating loops were used to plate bacteria into each quadrant on the agar plates.

26 ASM. 2019. *ASM Guidelines for Biosafety in Teaching Laboratories*. www.asm.org/Guideline/ASM-Guidelines-for-Biosafety-in-Teaching-Laboratory.

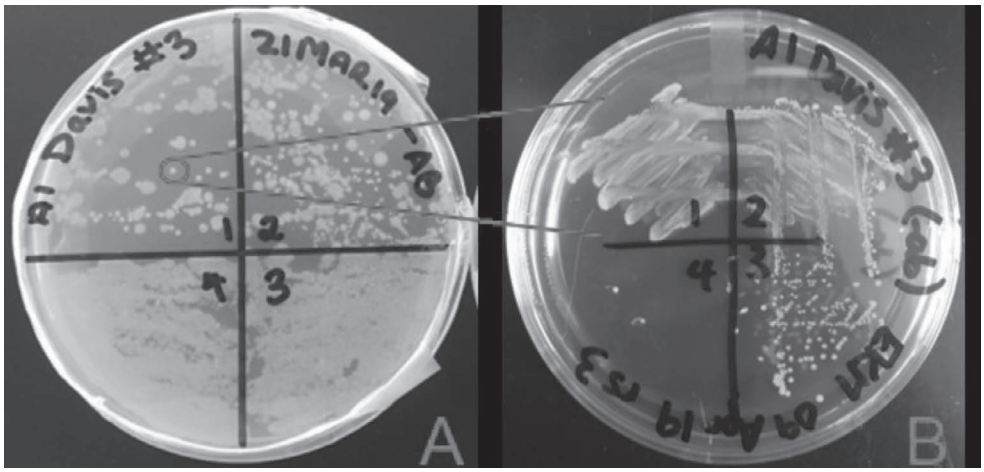

Figure 33.2 Colony preparation for isolation. (A) Colonies from incubated plate were provided to research students for identification. The colony circled in quadrant 1 indicates where a specific colony was selected for subsequent culture and replated to homogeneity of the species prior to characterization using the MALDI-TOF-MS.

(temperature, weather, etc.) at the time of sampling. Specimens were transported back to the laboratory in sealed bags, unopened until inoculation.

Following initial collection, each sample was quadrant streaked on two agar plates (Figure 33.1F), one containing antibiotic and the second without antibiotic (ampicillin) and incubated at 37 degrees Celsius for 48 hours at 5% carbon dioxide. Once plated, students minimized unnecessary agitation or contact with isolates by sealing the plates with parafilm. Each sample remained sealed for morphological observations by the nonmajor biology students. Sealed plates were provided to the research students for further culture and identification (Figure 33.2).

Isolate identification

After completion of morphological observations by introductory biology students, research cadets replated cultures to prepare isolates. Isolates were then analyzed using a Shimadzu Confidence Matrix-Assisted Laser Desorption/Ionization Time-of-Flight Mass Spectrometer (MALDI-TOF MS) and identified using the Shimadzu iD^{Plus} microbial identification system. Prior to MALDI analysis, all samples were replated on agar plates and incubated overnight prior to transferring to a Fleximass polymeric sample slide (Figure 33.3) using a sterile inoculation loop. For each sample, 0.5 μL of 25% formic acid was added followed by an additional 1 μL of a prepared matrix consisting of ~40 mg of α-cyano-4-hydroxycinnamic acid (CHCA) with 1 mL of 33/33/33 acetonitrile/ethanol/water (all HPLC grade) containing 3% trifluoroacetic acid (TFA). The sample slide was allowed to dry under ambient conditions and then loaded into the instrument, analyzed, and identified by comparison to the Spectral ARchive And Microbial Identification System (SARAMIS) database the same day as preparation of

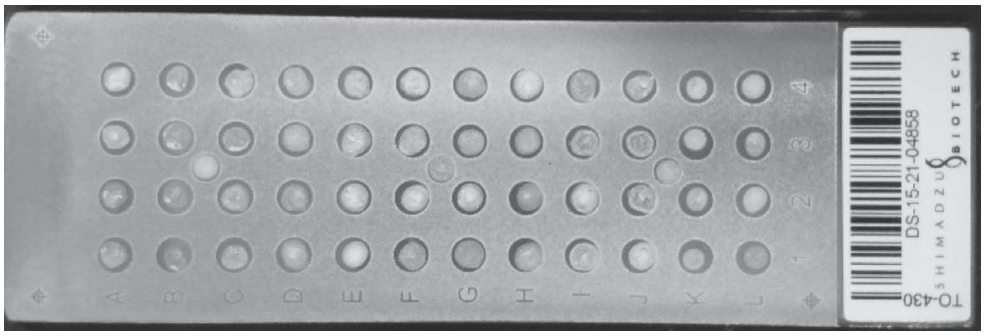

Figure 33.3 Fleximass polymeric sample plate. The four rows (columns A–L, left to right) show recently deposited microbial samples combined with CHCA matrix. The three sample wells between columns B/C, F/G, and J/K are for the DH5α-E™ standard controls.

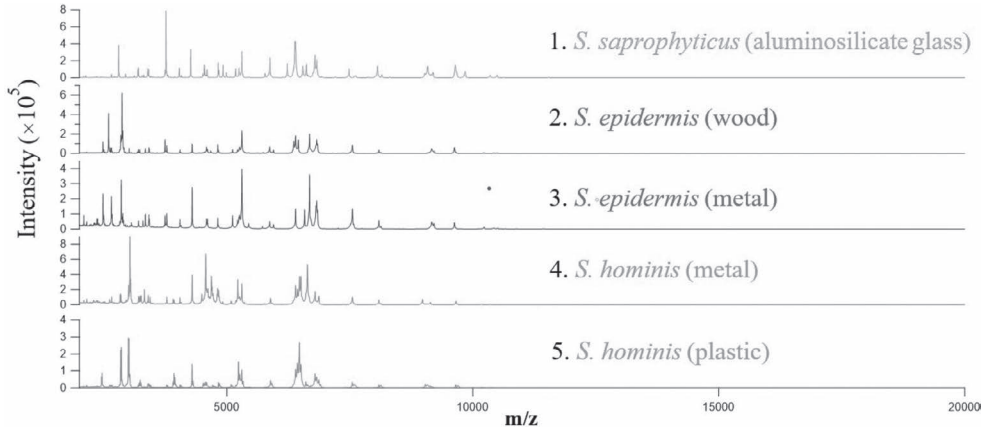

Figure 33.4 Spectral identification of isolates. Representative *Staphylococcus* spectra are shown. Italicized labels indicate species identification and surface type of original sample collection. *S. saprophyticus*, *S. epidermis*, and *S. hominis* spectral numbers correspond to traits listed in Table 33.1.

slide.[27] The standard sample wells, located between columns 2 and 3 on the sample plate, were loaded with 1 μL of a prepared stock solution made from combining 1 μL of ElectroMAX™ DH5α-E™ competent cells with 49 μL of prepared matrix, serving as a calibrant and a positive control.

Figure 33.4 illustrates spectra for five of the isolates. To generate spectra, samples must first be ionized in the instrument. A nitrogen laser operating at 337 nm is used to desorb the matrix and sample and ionize the matrix. Once desorbed, the sample is ionized by

27 Freiwald, A, and S Sauer. 2009. "Phylogenetic classification and identification of bacteria by mass spectrometry." *Nature Protocols* 4 (5): 732–742.

the matrix through a charge transfer mechanism. The ions are then separated by mass in the flight tube and detected as a voltage.[28] The peaks in the spectra in Figure 33.4 result from the ionization of intact proteins in the isolate. Instead of identifying each protein, the sample is identified through spectral comparison with the SARAMIS database by collectively assessing both the position of peaks on the x-axis (mass to charge ratio) and the intensity of the peak on the y-axis. The SARAMIS reference SuperSpectra used for identification are generated by combining individual reference spectra and assigning a peak weight to specific peaks to yield a score that is presented as a percent confidence. A score greater than 70% is considered high confidence,[29] with 85–89.9% spectral match providing a tentative identification and 90%+ as a positive isolate identification as measured by spectral comparison.

Results

We present illustrative examples that students can derive through this experience. For instance, the first step is to establish a tracking mechanism in which samples can be traced back to their original location (Table 33.1). The core biology students prepared samples

Table 33.1 Sample collection characteristics

Sample	*Ab resist*	*Species*	*Location*	*Surface type*
1.	no	*Staphylococcus saprophyticus*	Cadet smartphone screen	aluminosilicate glass
2.	no	*Staphylococcus epidermis*	Bartlett Hall – 3rd floor hallway – window ledge near study room	wood
3.	no	*Staphylococcus epidermis*	Bartlett Hall – 3rd floor men's latrine – flush handle	metal
4.	no	*Staphylococcus hominis*	Bartlett Hall – 3rd floor men's latrine – flush handle	metal
5.	no	*Staphylococcus hominis*	Brad Short Barracks – 5th floor communal room – Refrigerator handle	plastic
	no	*Moraxella osloensis*	Pershing Barracks – shower drain first floor	metal
	no	*Pseudomonas aeruginosa*	Scott Barracks – 55th Division – toilet bowl male bathroom	porcelain
	yes	*Pseudomonas aeruginosa*	Brad Short Barracks – 5th floor female shower stagnant pool of water on shower floor	tile
	yes	*Pseudomonas aeruginosa*	Scott Barracks – 55th Division – sink male bathroom	porcelain

Sample collection register for species identification illustrates the location where the sample was collected and the type of surface. Numbers 1–5 correspond to the Staphylococcus spectra from Figure 33.4. Select isolates were grown on growth media containing ampicillin, designated as Ab resistant; otherwise, isolates were characterized as nonresistant to the antibiotic containing growth media.

28 Muddiman, D, R Bakhtiar, S Hofstadler, and R Smith. 1997. "Matrix-assisted desorption/ionization mass spectrometry: Instrument and applications." *Journal of Chemical Education* 74 (11).

29 Cherkaoui, A, J Hibbs, S Emonet, T Manuela, M Girard, P Francois, and J Schrenzel. 2010. "Comparison of two matrix-assisted laser desorption ionization-time of flight mass spectrometry methods with conventional phenotypic identification for routine identification of bacteria to the species level." *Journal of Clinical Microbiology* 48 (4): 1169–1175.

on nutrient growth plates, one containing a selected antibiotic and the other without antibiotic. We selected ampicillin because it is routinely used in the laboratory and widely available. Ideally, microbes that grow on the plates with media alone will not grow in the presence of ampicillin. However, should growth occur on the antibiotic-containing plate this indicates that the microbe has acquired resistance to, in our case, ampicillin. This is concerning, as antibiotic resistance is an emerging public health concern. The data (Table 33.1) also indicates whether the identified species is resistant to the antibiotic, which will be useful as we further characterize the microbiome of sampled areas.

The independent research students identified isolates prepared from the introductory biology students' environmental samples. Representative spectral data is shown in Figure 33.4. For example, the five spectra are different species within the *Staphylococcus* genus. These spectra were traced back to the original sample characteristics collected by the introductory biology students in Table 33.1. Here, the genus and species identification of the five *Staphylococcus* spectra from Figure 33.4 are consolidated with the original sample collection information in Table 33.1 to include surface material type and location around campus. For example, sample 1 was collected from a cell phone screen that contained *Staphylococcus saprophyticus*. Sample 2, taken from a wooden window ledge contained *S. epidermis*. Internal controls (*E. coli*, spectra not shown) and blanks, no sample loaded, are included for quality control and testing of aseptic technique. In our representative data set, *Staphylococcus* colonies were found only on agar plates without ampicillin, suggesting that these organisms were not resistant to this specific antibiotic. For illustrative purposes, four additional samples are annotated in Table 33.1. *Moraxella osloensis*, responsible for the characteristic locker room odor, was found in a metal sink drain. Three selected samples contained *Pseudomonas aeruginosa* (spectra not shown), two of which exhibited growth in the presence of the selected antibiotic containing media, indicating ampicillin-resistant organisms.

Discussion

The traditional undergraduate student population spends much of their time within enclosed spaces. However, West Point cadets combine indoor and outdoor activities in a variety of academic, physical, and military settings. During these transitions they encounter a variety of microorganisms, some of which are pathogenic, but the majority commensal. By incorporating the disciplines of analytical chemistry, life science, and independent research, we developed a mechanism to characterize microbial patterns across representative surfaces with routine cadet contact. Following traditional swabbing of surfaces and microbial culture by biology students, the chemistry team took these isolate preparations and leveraged a complementary alternative using the MALDI-TOF-MS platform to fragment, or ionize, the sample. The unique mass spectral fingerprint was spectrally identified using the informatics within the associated database.

For our representative data, the presence of the ubiquitous pathogen *Staphylococcus* is not surprising, and all samples were responsive to antibiotic exposure. Although *Moraxella oslensis* is typically not a large concern from an infectious standpoint, it is the organism that provides the characteristic locker-room odor, likely traced to the source of the shower drain. Perhaps the most concerning samples were those of *Pseudomonas* found on the toilet, shower, and sink of various bathrooms. These organisms are a growing concern from an antibiotic resistance standpoint, as supported by two-thirds of the samples

growing in the presence of ampicillin. Should this organism enter the body via a cut or open wound, it could potentially be challenging to treat via traditional antibiotic therapy.

While these data represent a small portion of samples collected during the exploration of the microbiome at the academy, the initial goal was to relate the introductory biology students to a contemporary topic that could resonate within their daily lives. In addition, this would do so in a way to engage their science-oriented peers to leverage their own expertise and knowledge gained as a multidisciplinary bridge. This interdisciplinary approach practiced the scientific skills in both cohorts, nonscience and science majors, while encouraging scientific communication across all levels. Without this communication, the introductory students are limited to colony counts and morphological observations. Yet in tandem with their counterparts, these students could further identify species that otherwise could not be resolved through visual means. Moreover, this multidisciplinary research team identified an alternative mechanism to identify isolates without the time-consuming preparation of traditional sequencing methods. While the research students gained these skills, the introductory biology students were able to realize that direct contact with surfaces contributes to the likelihood of microbial transfer, whether it be on a cellphone or in a sink drain. Particularly in close-quarters environments, this baseline characterization of the microbiome can identify the common microorganisms to which students are exposed.

While several studies have explored bacterial colonization across select surfaces, few, if any, have analyzed the bacterial contents to examine the association between human contact and colonization. The scientific community is beginning to understand the relationship of indoor activities and human contact and how this contact influences microbial community structure.[30] However, using the MALDI-TOF MS approach has limitations. For example, the sample must be from a relatively fresh culture, as it relies on protein production for species identification; older samples will have degraded or diminished protein production. Additionally, mixed samples cannot be identified, and colonies may require additional serial isolations. Certain species have unique nutrient requirements aside from agar plates, and our example would represent a small fraction of microbes present. Similarly, limiting selection to one antibiotic does not fully represent the spectrum of antibiotic resistance within the community. However, this approach demonstrates how an interdisciplinary team can begin the characterization of a microbiome, specifically that of a West Point cadet. Planned studies will continue to refine this approach as a tool to further identify the seasonal microbes present within various locations across the academy. Specifically, cadets are very interested in answering which microorganisms are present within their gymnasium that anecdotally contributes to increased respiratory-related symptoms following the compulsory indoor obstacle course test.[31] This raises several interesting questions that West Point students have now assembled as a team to scientifically answer. This CURE supports the natural curiosity within the foundations of science, through an approach suitable for all students with clearly defined contributions to address a common goal – cooperative science that resonates with the masses.

30 Meadow, J, A Altrichter, S Kembel, M Moriyama, T O'Connor, A Womack, G Brown, J Green, B Bohannan. 2014. "Bacterial communities on classroom surfaces vary with human contact." *Microbiome* 2 (7).

31 *IOCT*. Available from www.youtube.com/watch?v=kzBPt0WQg7k.

Conclusion

In summary, we present a tool to apply biological theory and analytical skills in a manner of interest to the scientific community. While we plan to expand this effort into a more extensive assessment of the microbiome of West Point, this proof-of-concept study illustrates how multiple disciplines, biology, chemistry, and informatics can afford the opportunity for students to pursue independent avenues of inquiry addressing emerging issues of microbial diversity and perhaps multiple drug resistance. We have provided this framework such that faculty can facilitate the integration of this project while promoting core scientific competencies through the characterization of the microbiome with applications across disciplines.

Acknowledgments

We would like to thank Dr. Christopher Beck and Rachel Spell of REIL-Biology (2017) for introducing us to the CURE concept. We acknowledge the efforts of the USMA core biology faculty and support staff, Ms. Elizabeth Kent, Mr. Lance Richardson, Mr. Manuel Treus, Mr. Brian Dorn, and Mr. Devan Dipierro. We acknowledge Cadets Dowon Park, Fernando Sullivan, Songwen Liao, and Francis McConnell for assistance with sample analysis.

34 The impact of the vertical writing surface on teaching and learning in different disciplines

The writing's on the wall

Raymond A. Kimball, Jack Cooperman, Chris Fuhriman, and Eric J. Simpson

Introduction

One element of West Point pedagogy that sets it apart from most other higher educational institutions is our use of vertical writing surfaces (VWSs). There are four main types of VWS at West Point: the chalkboard, the whiteboard, the glassboard, and the interactive whiteboard.[1] VWSs are a component of every classroom at West Point, and unlike many conventional classrooms in other universities, West Point classrooms have VWSs throughout the classroom, sometimes on all four walls. The specific configuration and type of VWSs vary from department to department and even from classroom to classroom within a department. Many classrooms offer more than one type of VWS. This diversity is a product of the uniqueness of each academic building at West Point. Each building was constructed at a different period of time, and both renovations and updates have also occurred at different times. As West Point moves into a period of significant renovation of academic spaces, the academy's leadership asked a study team to take a fresh look at VWS use in West Point classrooms. Which VWSs "work" for each department? Which do not? This study sought to determine which VWSs provide the most value to the classroom for different departments, both for teaching by faculty and learning by students. Properly constructing tomorrow's classrooms today begins with knowing which VWS will best support the learning of future students.

Although this study began life as an internal review, it also has merit for faculty in other universities who want to relook first principles of their teaching environment. Few things in academia will provoke a more spirited discussion than a proposal to alter classroom writing surfaces. Faculty members will often hold forth at length about the merits of their preferred surface. That passion is entirely appropriate, as the literature suggests that VWSs are a powerful tool for learning at all levels. It is therefore all the more surprising that there is a dearth of research on *why* VWSs are useful, especially with respect to specific disciplines. It is the authors' hope that this study will make a meaningful contribution to

1 For the purposes of this study, a *glassboard* is defined as a VWS that is transparent or translucent, marked on by dry-erase marker. An *interactive whiteboard* is defined as a VWS with an integrated projector that allows for real-time manipulation of digital materials. As there are multiple brands of all four VWSs currently in use at West Point, further specificity by brand or model was not possible in this study.

this debate and provide both quantitative and qualitative support to VWS debates and decisions.

Literature review

Any assessment of VWSs should begin with the question: are VWSs still appropriate for use in 21st-century classrooms? A review of current literature suggests that they are. The practice of having a VWS as a central fixture in the classroom only became mainstream in the early 1800s,[2] and West Point is one of a small number of undergraduate institutions that feature VWSs for students and instructors alike in a majority of its classrooms. A study of medical student instruction found that instructor use of projected content and VWS together was more effective in communicating complex concepts than either projected content or VWS use by itself.[3] The relative permanency of a VWS, as compared to an electronic display, was assessed to be helpful for student learning.[4]

Additional research suggests that providing instructors and students alike with VWSs is a boon to effective teaching. One researcher found that student use of VWSs decentralized classroom instruction, helped students offer assistance to one another, and allowed the instructor to quickly assess systemic problems.[5] Another found that student VWS use sustained their interest and helped promote a problem-solving approach.[6] There is evidence to suggest that the impact of student VWS use varies by discipline: a Turkish study found that positive student attitudes toward VWSs were almost 20% higher in math classes than in other disciplines.[7]

Why does VWS use correlate with effective teaching? The literature offers several closely linked possibilities. One researcher suggested that when an individual's thoughts are seen in writing, they become more concrete and easier to grasp.[8] Another assessed that the ease of erasing on VWSs (as opposed to marking on paper) promotes student willingness to risk trying out answers or efforts that may not produce results.[9] Other affordances of VWS use include the interactivity of directly manipulating learning objection and the multimodality of different communication modes.[10] VWS use is assessed as being supportive of a "dialogic teaching" method that emphasizes collective, reciprocal

2 Keith Greenhalf, "The Rise of the Classroom Blackboard," *ETEC540: Text Technologies*, October 27, 2013, http://blogs.ubc.ca/etec540sept13/2013/10/27/the-rise-of-the-classroom-blackboard/.

3 Sultan Ayoub Meo *et al*, "Comparison of the Impact of PowerPoint and Chalkboard in Undergraduate Medical Teaching: An Evidence Based Study," *Journal of the College of Physicians and Surgeons Pakistan* 23, no. 1 (2013), 48–49.

4 Gary Beauchamp and Steve Kennewell, "The Influence of ICT on the Interactivity of Teaching," *Journal of Education and Information Technologies* 13, no. 4 (2008), 310.

5 Tricia Forrester *et al*, "Vertical Whiteboarding: Riding the Wave of Student Activity in a Mathematics Classroom," *AMT* 73, no. 4 (2017), 11.

6 Peter Liljedahl, "Building Thinking Classrooms: Conditions for Problem-Solving," in *Posing and Solving Mathematical Problems*, eds. Patricio Felmer *et al* (Geneva, Switzerland: Springer/Cham, 2016), 7.

7 Nuri Balta and Muharrem Duran, "Attitudes of Students and Teachers toward the Use of Interactive Whiteboards in Elementary and Secondary School Classrooms," *The Turkish Online Journal of Educational Technology* 14, no. 2 (2015), 18.

8 David Henry *et al*, "Whiteboarding Your Way to Great Student Discussions," *NSTA WebNews Digest*, March 30, 2006, www.nsta.org/publications/news/story.aspx?id=51894, 4.

9 Liljedahl, 10.

10 Sara Hennessy *et al*, "A Dialogic Inquiry Approach to Working with Teachers in Developing Classroom Dialogue," *Teachers College Record* 113, no. 9 (2011), 4.

learning among students and teachers that emphasizes supportive approaches and cumulative learning.[11] To that end, whiteboarding helps to orchestrate coordination of student and teacher efforts to achieve a synthesis of classroom experiences.[12]

The literature is far less definitive on whether specific types of VWSs (e.g., chalkboards, whiteboards, and glassboards) are superior for instruction. One defense of VWS use over electronic displays suggests that chalkboard use, in particular, slows the instructor's writing and commentary to a pace that students can more easily follow.[13] This narrative only differentiates chalkboards from other VWSs with the statement "Getting dirty is part of the professional culture of civil engineering."[14] Chalkboards are anecdotally cited as being longer-lasting and easier to maintain than other VWSs;[15] no systematic studies to support this claim could be found. Likewise, chalkboards are frequently critiqued for their negative impact on classroom technology and the impact of chalk dust on human health. No systematic studies of the former could be found; one study of chalk use's correlation with harmful air quality found that hazard could be ameliorated with the use of chalk formulated to be "anti-dust" or "clean write."[16]

Methodology

The study was conducted in two parts: first, a voluntary web-based survey for both West Point faculty and cadets and, second, a focus group for both cadets and faculty. The voluntary web-based survey, conducted on USMA's Qualtrics platform, was sent to USMA cadets and faculty via email distribution. The purpose of the survey was to gather both qualitative and quantitative data capturing the experiences and opinions of cadets and faculty with respect to four types of VWSs: chalkboards, whiteboards, glassboards, and interactive whiteboards. The survey asked participants to identify their department affiliation, either as assigned (for faculty) or for instructional major (for cadets). The authors chose the academic department as the unit of analysis for two primary reasons. First, there is a strong sense of identity at the department level at West Point. While individual instructors have the freedom to employ their own pedagogical practices, each department has its own teaching culture that is perpetuated through instructor development workshops for incoming faculty. Moreover, maintaining a standard classroom configuration across a department's footprint is feasible; reconfiguring classrooms with a different VWS each time the assigned instructor changes is simply not practical or efficient. Second, the survey could ensure respondent anonymity by binning the results at the department level. Only cadets in the upper two classes were surveyed, to ensure participants had sufficient experience in their chosen discipline. Additionally, respondents were asked to provide feedback only for the VWSs they had personal experience using or observing in person. Surveys can be found in Appendix A.

11 Karen Littleton, "Research into Teaching with Whole-Class Interactive Technologies: Emergent Themes," *Technology, Pedagogy and Education* 19, no. 2 (2010), 286.

12 Ibid, 288.

13 Stephen Ressler, "Whither the Chalkboard? Case for a Low-Tech Tool in a High-Tech World," *Journal of Professional Issues in Engineering Education and Practice* 130, no. 2 (2004), 71–72.

14 Ibid, 73.

15 Greenhalf.

16 Deepanjan Majumdar, "Assessment of Airborne Fine Particulate Matter and Particle Size Distribution in Settled Chalk Dust during Writing and Dusting Exercises in a Classroom," *Indoor and Built Environment* 21, no. 4 (2012), 541.

All cadets in the study population (see the previous) and faculty were invited to participate in focus groups in classrooms equipped with the different types of VWSs studied. These focus groups occurred over the course of two weeks on multiple iterations of both Day 1 and Day 2 in different classrooms in two geographically separate academic buildings to provide maximum flexibility for participants and to provide participants with access to each type of VWS studied. VWS study staff encouraged the focus group participants to bring work that was typical of VWS use in their discipline. Next, VWS study staff asked focus group participants to conduct said work on the various VWSs. VWS study staff facilitated access to the VWS while remaining neutral with respect to the effectiveness of the various VWSs. Focus group participants typically completed their field work in about 15 minutes. Finally, focus group participants were provided a URL and asked to complete an online survey about their experience. The focus group exit survey can be found in Appendix B. Because the turnout for the focus groups was substantially less than the responses to the survey ($n < 10$), the focus group survey responses are not included in this study report. All research for this study was conducted under an approved human subjects research exempt review conducted by the USMA Human Protections Director.

Findings

The findings in this section are organized by quantitative insights and qualitative insights.

Quantitative insights

Two hundred sixteen Cadets and 189 faculty members responded to the survey, indicating their experiences with the different surfaces and at least one VWS that was most effective for their discipline. Respondents represented 16 different departments or agencies on West Point. Cadets and faculty from the Department of Civil and Mechanical Engineering represented the single largest group of respondents.[17] Figure 34.1 illustrates

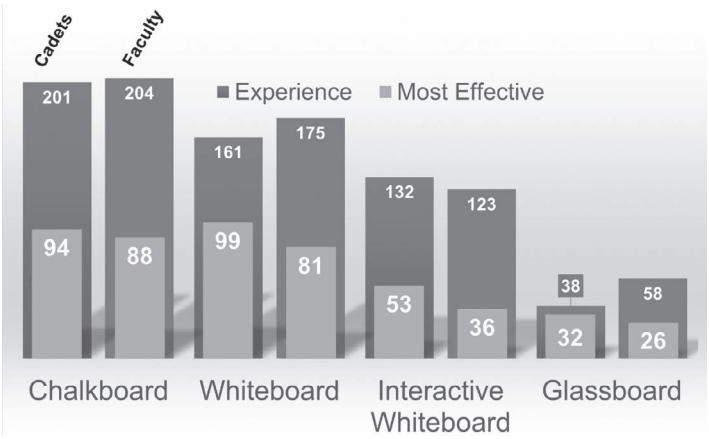

Figure 34.1 Responses indicating VWS experience and assessment of most effective VWS.

17 A complete list of department full names corresponding to the abbreviations in tables is included in Appendix C.

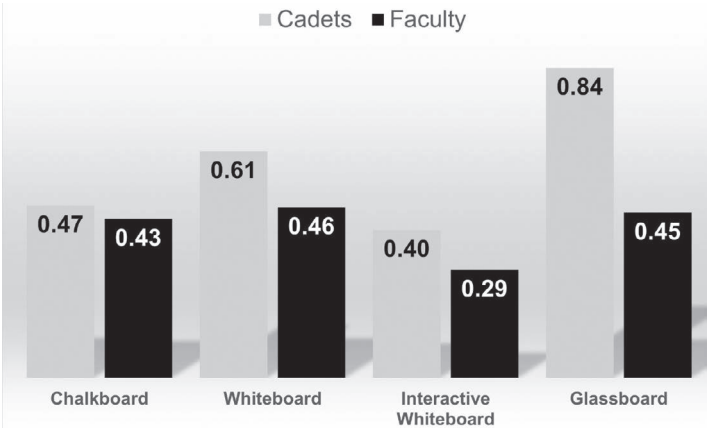

Figure 34.2 VWS preference/experience ratio.

the survey responses, with cadet responses for each VWS displayed on the left-hand side and faculty responses on the right. Cadets and faculty had the most experience with chalkboards, with whiteboards coming in second and interactive whiteboards in third. Less than one-fifth of cadets and less than one-third of faculty members had experience with glassboards. Overall, chalkboards received slightly more votes than whiteboards (182 to 180) as most effective, with cadets and faculty holding differing opinions. Raw numbers, however, do not tell the whole story. Perceived effectiveness is naturally impacted by experience. A cadet may rate one surface as "most effective" because that is the only VWS he or she knows or simply because that is what the instructor uses. Figure 34.2 captures this experience factor by presenting the preference/experience ratio. This ratio is the number of "most effective" responses for each VWS divided by the number of responses of experience with that VWS.

This measure reveals that both cadets and faculty significantly favor whiteboards over chalkboards. Perhaps the most interesting result concerns glassboards. Though few cadets or faculty have experience with this VWS, 84% of cadets that do rate it as most effective.

Preferences changed, however, when we organized responses by STEM (science, technology, engineering, and mathematics) and non-STEM disciplines (see Figure 34.3).

Both cadets and faculty in STEM departments have a clear preference for chalkboards. Similarly, cadets and faculty in non-STEM departments prefer whiteboards to chalkboards. One wonders if this cadet and faculty agreement is an indicator that these two VWSs are in fact more effective for their respective disciplines or if faculty preferences have created a "culture" within the departments that shapes cadet preferences. Interestingly, both STEM and non-STEM respondents seemed to hold similar opinions about the effectiveness of interactive whiteboards and glassboards. The idea of a VWS "culture" within departments is best illustrated by the Department of Civil and Mechanical Engineering (see Figure 34.4). Cadets and faculty overwhelmingly rate chalkboards as most effective, offering almost no consideration for other surfaces.

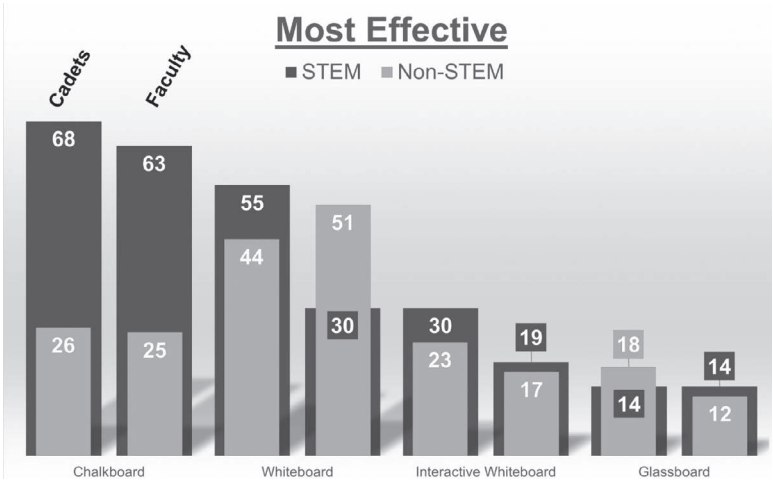

Figure 34.3 "Most effective" VWS ratings, broken out by STEM/non-STEM departments.

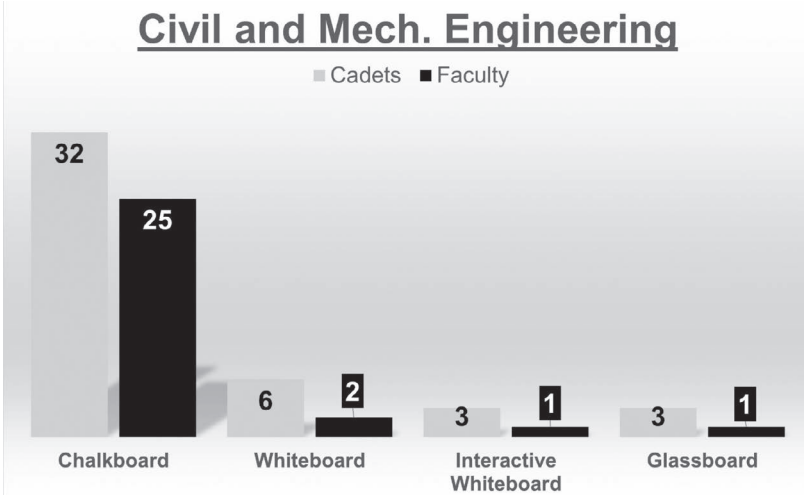

Figure 34.4 Survey responses from the Department of Civil and Mechanical Engineering.

Qualitative insights

Cadet preferences for vertical writing surfaces were varied, both within disciplines and across the range of academic majors. Participants answered questions about the strengths, weaknesses, best practices, and common mistakes they have experienced with each of the vertical writing surfaces. The following paragraphs address qualitative responses from cadets regarding each of the four classroom writing surface references in the survey.

Chalkboards

The most frequently cited strengths were ease of use, ease of seeing the writing, ease of upkeep, and versatility (in terms of chalk colors). Respondents also mentioned lower costs of chalk compared to other writing instruments, the reliability of chalk (does not dry out), and the facilitation of students' individual and group work at the boards around the class. The most frequently cited weakness was, by far, the dusty, messy nature of chalkboards. Other weaknesses included difficulty in cleaning the boards, squeaky chalk, and the overall lack of chalk and erasers in the classrooms. Best practices included using chalkboards for board problems, using different colors of chalk, and cleaning the boards with a wet cloth or sponge. Common mistakes noted were incomplete erasing or cleaning, the lack of chalk and erasers on hand, and chalk dust on uniforms, computers, and other equipment. The responses ranged from love to hate, but chalkboards emerged as a popular choice for cadets.

Whiteboards

The most commonly identified strengths were the ease of use, the ease of cleaning, and overall cleanliness and neatness (due, in part, to the lack of chalk dust). Other strengths mentioned included the versatility of colored markers, ease of seeing the writing, and the ability to project images onto the surface. The most frequently cited weakness was the fact that markers dry out, and as many pointed out, there is no indication of ink levels. Other weaknesses included the lack of markers in the classrooms, the residue or "ghosting" stains that develop over time, and the glare produced at certain angles. Best practices included using multiple colors of marker, cleaning the boards with the proper solution, and using the surfaces for board work. Common mistakes included the accidental use of permanent markers on the whiteboards, using old or low-quality markers, and not cleaning the boards before the markers stain the surface. There was a wide range of opinions about whiteboards as well, including high praise and outright disdain. Still, whiteboards and chalkboards produced the highest totals of preferred surfaces.

Glassboards

The most frequently cited strengths were overall cleanliness, ease of use, and the aesthetically pleasing, modern appearance. The most frequently mentioned weaknesses included the glare and/or the "glass shadow," the fact that markers often dry out, and the difficulty in seeing some colors on the surface. Best practices included having the proper number of fresh markers available, board work, and ensuring each classroom has glass cleaner. Common mistakes included the lack of working markers, limited workspace, and the use of light-colored markers. Cadets had the least amount of exposure to this vertical writing surface. Consequently, glassboards received the least amount of discussion in the survey.

Interactive whiteboards

The most popular strength of this surface was the ability to draw or annotate directly on the presentation or document on the screen. Other strengths mentioned frequently were the ability to incorporate graphics and multimedia, software integration, and overall versatility. The most frequently mentioned weaknesses were technical problems with the boards and the lack of training or knowledge of how to access the board's full

functionality. Other weaknesses mentioned included the requirement to have batteries for the pens, limited number per classroom and per department, and the expensive overhead and operating costs. Best practices for this surface included using the full capabilities of the system, integrating multiple programs, visualizations, documents, etc., and emailing the board notes to students at the conclusion of class. Common mistakes included the lack of technical training to use the system and spending too long troubleshooting in class. This option seemed to be less desirable than both chalkboards and whiteboards.

Faculty preferences and feedback were also varied across disciplines and the range of academic majors. The following paragraphs address qualitative responses from faculty regarding each of the four classroom writing surface references in the survey.

Chalkboards

Because chalkboards are the most widely used VWS at USMA, they drew the largest share of qualitative feedback, both positive and negative. Many faculty members praised the simplicity of chalkboards, stressing their reliability in power outages, their durability over time, and the ease of determining whether there is sufficient chalk for a lesson. Quality of chalk was heavily stressed, with high-quality chalk perceived as smearing less, squeaking less, and being easier to clean. Others noted the ease of referring back to previous boards and the fact that writing on a chalkboard slows the delivery of information to a more easily absorbable pace. Cleaning of chalkboards was a strongly divisive issue. Some faculty members bemoaned different norms about frequency of cleaning in different departments, which lead to varying states of cleanliness between classes. Others provided different techniques for cleaning the boards; several participants noted that the new dean's method for cleaning works well.[18] The prevalence of chalk dust and lack of interactivity were the primary concerns cited with the use of chalkboards. Others voiced concerns that chalkboard use needed to be part of an overall pedagogical strategy rather than just used by default because of their ubiquity and ease of use.

Memorable Chalkboard Statements from Faculty:

> "There are no real strengths of chalkboards for my discipline other than giving us fun stories to talk to old grads about when they visit class and remark that they remember doing physics on the chalkboard."
>
> "I feel a connection with generations of chalkboard users."
>
> "Chalkboards have a long and storied history at West Point, inspiring both instructors and cadets."
>
> "Needless to say, lugging a bucket of dirty water down a hallway and wiping down a board with a nasty sponge/rag/mitt is not why I got into higher education. This is the 21st century – as a 19th century (or earlier?) technology, chalk's time has come and gone. Let's get with the program!"

18 West Point – The U.S. Military Academy, "So You Know Ep1 Classroom Upkeep," *YouTube*, March 5, 2018, https://youtu.be/7_viCs2gnA8.

Whiteboards

Whiteboards were seen as having similar strengths and weaknesses as chalkboards, although diverging in a few key areas. Faculty members praised the higher contrast of whiteboards as being easier to see and utilize as a projection surface, with the option of easily annotating digital projections. Many faculty members also felt that it was easier to integrate multiple colors on a whiteboard because multi-colored markers are more plentiful than multi-colored chalk. Faculty members differed on whether whiteboards were easier to write on than chalkboards; while a majority of commenters felt it was easier, a vocal minority stated that whiteboards have insufficient friction to write smoothly and consistently. A readily available stockage of high-quality markers was urged as a means of combating both poor writing and markers running dry on ink. Cleanliness again was a major point of friction; several faculty members complained that whiteboards quickly build up ghost remnants of prior writing over time. Several respondents stressed the importance of systematic cleaning using proper solvents or creams to avoid this problem. Respondents voiced frustration that there is no way to tell ahead of class if a marker has sufficient ink for the entire class session.

Memorable Whiteboard Statements from Faculty:

"There are no strengths to whiteboards – they are terrible!"

"Keep them in collaboration areas but out of the engineering class rooms!"

Glassboards

Glassboards are a much more recent introduction to USMA, so they garnered the least amount of feedback of any VWS. Many of the same strengths and critiques of whiteboards, like marker use and cleanliness, carried over to glassboards. Some respondents noted that glassboards have a cleaner, more modern look than chalkboards or whiteboards. The transparency of glassboards was largely cited as a strength, since glassboard walls allow more light into otherwise enclosed areas and allow for pedagogies like reverse annotations by students on top of instructor markings. The use of glassboard walls without a neutral surface behind them was cited as challenging due to the lack of contrast.

Memorable Glassboard Statements from Faculty:

"They are better than white boards, but beyond that I think they are just the new cool surface."

"No inherent strengths above and beyond a whiteboard or chalkboard."

Interactive whiteboards

Interactive whiteboards were seen as having great potential that is largely unrealized due to unreliable power and networks, lack of faculty training, and dearth of maintenance support. Interactive whiteboard responses had the largest number of new pedagogy suggestions, such as pulling and integrating notes from previous sessions, recording a session

for future playback, and saving the content of a slide with future annotations. Faculty members noted that ease of clearing an interactive session at the conclusion of class compared to the other VWSs. Many proponents of interactive whiteboards acknowledged that frequent power and network outages at USMA make their routine use problematic. Other faculty members stressed that interactive surfaces require frequent calibration and maintenance that is not supportable under current USMA IT staffing. The amount of training required to readily utilize all of the interactive whiteboard's functions was also raised as a concern, with some faculty members opining that the rapid obsolescence of different systems further added to faculty training loads. Greater maintenance support, standardized training, and standard user settings within a department were all cited as possible mechanisms for more effective interactive whiteboard use.

Memorable Interactive Whiteboard Statements from Faculty:

"To be honest, between YouTube, DVDs, Word docs, PPTs, and maps on the Epson, and playing music, I have enough tech right now. The main thing I want is a discussion with some breadth."

"If you find one in your classroom, ask for it to be removed and discarded."

"Nobody knows how to use them. Not worth the hassle to use them. Reminds me of TVs in the classrooms in the '70s. Never really got used, now did they?"

Conclusion

The results of this study reveal both deep-seated preferences for writing surfaces and diversity of options for implementation. The authors provided the results of this study to West Point's leadership, which is now using the data to actively shape the development of new classroom designs. Leaders are also assessing secondary costs associated with each VWS, including supplies, technical support contracts, and training faculty on their use. Finally, policies are in work to more clearly stipulate VWS purchasing and maintenance responsibility at the department and directorate level. VWSs will continue to be an essential element of instruction at West Point, but the number and type to be used remains an open question.

Appendix A

Initial surveys

Online survey – cadet

Please identify your class year [pull-down with 2018, 2019, 2020]. [NOTE: cadets answering 2021 or 2022 were redirected to a screen indicating that they are not part of the study population.]

Choices: 2018, 2019, 2020

Please identify the department affiliated with your major [pull-down]. If you are pursuing a double major with two departments, please select the department in which you have taken the most classes.

Please select the classroom vertical writing surfaces (VWSs) that you have used or seen used in your department's instruction. The information icon next to each selection contains pictures of typical USMA installations of this item for your reference.

__ Chalkboard
__ Whiteboard
__ Glassboard
__ Interactive Whiteboard

[For each VWS selected, participants were asked to answer the following questions:]

What are the strengths of this VWS with respect to your discipline?
What are the weaknesses of this VWS with respect to your discipline?
What best practices, if any, can you share in the use of this VWS?
What common mistakes, if any, can you share in the use of this VWS?

[After all entries for selected VWSs, participants were asked the following:]

Reflecting back on your responses, please select the VWS that you think is MOST effective for your discipline.

__ Chalkboard
__ Whiteboard
__ Glassboard
__ Interactive Whiteboard

Please explain the reasoning behind your response.

Online survey – faculty

Please identify your department affiliation. If you are affiliated with more than one department, please select the department where you have done the majority of your teaching.

Choices: All academic departments plus CEP and Library

Please select the classroom vertical writing surfaces (VWSs) that you have used or seen used in your department's instruction. The information icon next to each selection contains pictures of typical USMA installations of this item for your reference.

__ Chalkboard
__ Whiteboard
__ Glassboard
__ Interactive Whiteboard

[For each VWS selected, participants were asked to answer the following questions:]

What are the strengths of this VWS with respect to your discipline?
What are the weaknesses of this VWS with respect to your discipline?
What best practices, if any, can you share in the use of this VWS?
What common mistakes, if any, can you share in the use of this VWS?

[After all entries for selected VWSs, participants were asked the following:]
Reflecting back on your responses, please select the VWS that you think is MOST effective for your discipline.

__ Chalkboard
__ Whiteboard
__ Glassboard
__ Interactive Whiteboard

Please explain the reasoning behind your response.

Appendix B

Focus group exit survey

Thanks for being part of this Vertical Writing Surface Focus Group! Your responses will remain completely anonymous.

Please select your department affiliation or the department affiliated with your major. If you are a cadet pursuing a double major with two departments, please select the department in which you have taken the most classes. If you are a faculty member affiliated with multiple departments, please select the department where you have done the majority of your instruction.

Please select the classroom vertical writing surfaces (VWSs) that you used in today's focus group. The information icon next to each selection contains pictures of typical USMA installations of this item for your reference.

__ Chalkboard
__ Whiteboard
__ Glassboard
__ Interactive Whiteboard

[For each VWS selected, participants were asked to answer the following questions:]

What were the strengths of this VWS for the work you did today?
What are the weaknesses of this VWS for the work you did today?

[After all entries for selected VWSs, participants were asked the following:]

Based on your experience today, please select the VWS that you think is MOST effective for your discipline.

__ Chalkboard
__ Whiteboard
__ Glassboard
__ Interactive Whiteboard

Please explain the reasoning behind your response.

Appendix C

Departmental abbreviation glossary

BS&L – Behavioral Sciences and Leadership
C&LS – Chemistry and Life Sciences
CEP – Center for Enhanced Performance
CME – Civil and Mechanical Engineering
DEP – English and Philosophy
DFL – Foreign Languages
DMI – Military Instruction
DPE – Physical Education
EECS – Electrical Engineering and Computer Science
G&EnE – Geography and Environmental Engineering
HIST – History
LAW – Law
LIBRARY – Library
MATH – Mathematical Sciences
PANE – Physics and Nuclear Engineering
SOSH – Social Sciences
SYS – Systems Engineering

35 Staff rides 2.0

Expanding on an old Army tradition

Lionel Beehner, Liam Collins, Robert J. Goldstein, and Jason R. Musteen

The U.S. Army has long used staff rides – planned learning events at historical sites – to educate current and future officers on leadership, decision making, strategy, and military tactics.[1] Through observation, discussion, and reflection using the actual terrain where the battles were fought, students have the potential to learn more than they could in a classroom. Often, instructors bring students to walk the hallowed grounds of critical battles like Gettysburg, Antietam, Waterloo, or Normandy. But they may also include lesser-known battles in closer proximity, or one that can teach a specific lesson.

Staff rides are more than guided tours of historical battlefields; they are dynamic pedagogical tools that let students research characters, assume their persona, discuss the various options or moral quandaries commanders at the time faced, and orient them to the importance of complex terrain and topography. More importantly, they can help cadets understand current events more clearly and the various challenges they will likely face in the current operating environment.

For more than a century, West Point faculty have used staff rides as an extremely effective pedagogical tool for learning, yet only recently has West Point expanded its use beyond the traditional military staff ride. It is an extremely effective pedagogical approach that remains largely underutilized outside of military academies. The aim of this chapter is to demystify the concept and make it more accessible to lay instructors. In effect, a staff ride is nothing more than the military's version of a retrospective case study.

In this chapter, we outline three novel takes on the traditional staff ride to pedagogically usher this 19th century conception – Prussian officers are credited with developing the concept after the Franco-Prussian War – into the 21st century. The purpose of this chapter is to demonstrate the value of nontraditional staff rides and how they can be employed in a multitude of contexts to educate future generations, not just of cadets but also students of virtually any subject or discipline, and to inspire other educators to build on and innovate the concept for their own classroom needs, incorporating it as a valuable pedagogical tool across institutions of higher learning.

We start with a brief description of a traditional staff ride, use learning theory to explain why it is such an effective learning tool, and then explain why nontraditional and research staff rides have utility beyond the military. We describe three different staff rides carried out at West Point, by its History, Military Instruction, and Law Departments. We describe the background and motivation behind each department's staff ride, provide

1 Wendy S. Becker and M. J. Burke, "The Staff Ride: An Approach to Qualitative Data Generation and Analysis," *Organizational Research Methods* 15 (2012): 316–335.

colorful vignettes to illustrate how they are carried out, and assess their pedagogical effectiveness and influence on cadet education and professional development.

The Army staff ride and learning theory

While the goals of staff rides may vary, they all "have one idea in common – to place students on an actual piece of terrain, confront them with an operation situation, and stimulate them to reach conclusions or derive lessons from the experience."[2] A staff ride includes three phases: preliminary study, field study, and integration. The preliminary study phase prepares the students for the visit though a mix of lectures, individual study, and group discussion. The participants must understand the purpose of the staff ride and "develop an intellectual perception of the campaign."[3] Participants are normally assigned roles – such as Robert E. Lee or George C. Meade – or functions – such as signals, logistics, or information operations – that they research.

The field study phase is "designed to visit all significant sites associated either with the selected campaign or with the portion emphasized in preliminary study."[4] At each planned stop, the instructor team orients the group in space and time and then facilitates the discussion to drive home key lessons. Students are active participants and often take on the persona of the characters that they were assigned during the preliminary study, describing what "they" did and why in the first person. If assigned functions, such as logistics, the student describes the role of that battlefield function in the campaign or battle.

The integration phase is a "formal or informal opportunity for students and instructors to reflect jointly upon their experience."[5] The integration phase can occur on the battlefield, at a nearby location, or back at home, but it is best when accomplished immediately following the field study. If done correctly, it allows students to "analyze the previous phases and integrate what they learned in each into a coherent overall view," it provides a mechanism for students to "organize and articulate their impressions" of the campaign and the lessons derived from the study, and students "gain additional insights from sharing these impressions with their peers."[6]

It is important to briefly distinguish staff rides from other pedagogies. While battlefield and guided tours include site visits, participants conduct less (or no) preliminary study and are "more passively involved in deep reflection."[7] Like staff rides, after action reviews "involve collective retrospection and intensive cognitive review of experiential data," but participants focus on their own performance as opposed to analyzing the experience of others.[8]

The theoretical and methodological foundation for the staff ride is grounded in experiential learning theory. "[E]xperiencing the physical terrain and environmental conditions

2 William G. Robertson, *The Staff Ride* (Washington, DC: U.S. Center of Military History, 1987), 4, https://history.army.mil/html/books/070/70-21/CMH_Pub_70-21(2014).pdf.

3 Ibid., 13.

4 Ibid., 14.

5 Ibid., 17.

6 Ibid., 17–18.

7 Wendy S. Becker and Michael J. Burke, "Instructional Staff Rides for Management Learning and Education," *Academy of Management Learning & Education* 13, no. 4 (2014): 515.

8 Ibid.

surrounding the critical incidents that comprise a historical event in the presence of others engenders reflection in and on action and helps to construct new learning."[9] The purposeful, active, and public reflection "represents the highest level of reflection in adults and the level that leads to learning new meaning."[10]

Thus, as a pedagogical approach the staff ride offers great potential, but it remains largely underutilized outside the military. Yet its use has expanded in recent years. The U.S. Forest Service adopted the use of staff rides in 1999 to increase learning on wildfire training, and the Park Service adopted staff rides for public health education. Recently, Becker and Burke have argued the utility of expanding the use of staff rides for management learning and education.[11] We similarly find the staff ride has great utility beyond the traditional military use.

At its core, a research staff ride is nothing more than a retrospective case study. It is retrospective in that the events have already occurred. But what distinguishes a research staff ride from a traditional staff ride, say to Gettysburg, is that there is no existing staff ride book, so the students must go gather the evidence for themselves. They must interview ex-combatants, participants, victims, officials, and other experts to understand the event in question. Thus, the research staff ride approach can be applied to gain greater learning for just about any historical event: the civil rights movement, the Chernobyl disaster, the Bosnian civil war, the 2008 Mumbai terrorist attacks, or the Ferguson, Missouri, protests.

Department of History: building character through nontraditional staff rides

West Point's Department of History conducts several nontraditional staff rides each year during spring break and summer sessions.[12] Moving beyond military operations, they are interdisciplinary in approach, typically involving an examination of politics, economics, society and culture, religion, language, geography, law, literature, and philosophy. Each one is different according to the selected goals, yet they each serve USMA's mission "to educate, train and inspire the Corps of Cadets."

Staff rides are typically three-credit history courses that include one or two weeks of classroom preparation followed by two weeks of on-site study. The classroom phase is rigorous, with nightly academic readings and writing assignments, in addition to discussions and preliminary visits to other locations. The staff rides usually include 8–15 cadets led by two or three instructors. They seek to merge academic learning and professional military education with leadership and character development. A donor who has supported some of these nontraditional staff rides best summarized their value: "If I can move you physically, I can move you emotionally."[13] Not unlike traditional staff rides, it is that stirring of "on-site" emotions that becomes the catalyst for learning and development.

These nontraditional staff rides maintain several recognizable elements common to operational staff rides: extensive travel, navigation across terrain, with an added emphasis on human terrain; a broad and deep examination of historical decisions; and a

9 Ibid., 512.

10 Ibid.

11 Becker and Burke, "The Staff Ride" and Becker and Burke, "Instruction Staff Rides."

12 Jason R. Musteen, "Nontraditional Staff Rides at West Point," *Army History* 110, no. 4 (2019): 28–35.

13 Terry Gallagher, conversation with the author concerning the World War I in Literature and Memory Staff Ride, 2013.

consideration of possible alternatives available at the time. Yet they differ from more traditional staff rides in a couple important ways. First, they might not be concerned with a military operation at all. They might instead focus on nonmilitary events or examine various national or regional identities and cultures. Second, those that are primarily concerned with military history typically focus on the strategic level of war, or they might consider the moral and emotional impact of warfare on individuals and societies.

The Department of History has conducted dozens of these types of staff rides, typically two during spring break and two or three each summer. Recent examples include society in Cold War Europe (Berlin, Vienna, Prague, Budapest, Krakow, Warsaw), modern Israel (1948–present), the Spanish Reconquista, Japanese identity since the Edo/Shogun period (1603–present), and Tanzanian culture. Sometimes these staff rides merge studies of military campaigns with understandings of culture or of race, ethnicity, and nationality, such as the Boer and Zulu Wars in South Africa or an examination of American westward expansion and the U.S. Army's role in that process. Forthcoming staff rides include the 1995 normalization of diplomatic relations between the United States and Vietnam and the Rwandan civil war and genocide. Rather than military operations, these staff rides will consider identity, conflict resolution, and reconciliation.

Design and execution

The department's study of World War I exemplifies the educational and professional benefits of these nontraditional staff rides. As part of the centennial commemoration of the war, cadets studied and visited the Western Front in 2014, 2016, and 2018. Rather than examining operations, the cadets explored individual memory through the literature, memoirs, and poetry of those who participated, as well as how collective experiences shaped national memory and commemoration of the war. Studying the words written by those who experienced the war, cadets wrestled with motives for service, memory of combat, loss, grief, and the challenges of leadership. Stepping into the shoes of those soldiers was transformative; as one cadet recognized,

> History was no longer a series of dates, important figures, and battles that I had to commit to memory. It was real. It was tangible. I learned of the power and importance of empathy not only in the study of history, but also in leadership, officership, and friendship in a way that continues to shape my relationships.[14]

At one point during the staff ride, cadets rose well before dawn and occupied a portion of extant trench line in a section of woods on the Somme battlefield. In 1916, the trench's occupants included two of the greatest poets of the war, Lieutenants Siegfried Sassoon and Robert Graves of the Royal Welch Fusiliers. Standing just below the century-old parapet, the cadets silently observed stand-to – a state of military readiness assumed by troops at dawn or dusk – for 30 minutes as the sun rose from behind the German trenches beyond No Man's Land, noting the sights, sounds, and smells of their surroundings. They then gathered in the quiet below and read two poems that describe a different morning routine on the front, one violent and the other monotonous. After a lengthy discussion

14 Cadet Tyler Shekleton, e-mail to the author 18 months after the staff ride.

of the experiences of lieutenants in the trenches, the cadets walked 200 meters to a small British cemetery where Lieutenant David Thomas is interred.

Thomas was Sassoon and Graves's best friend. Standing at his grave and reading his friends' recollection of his life and death, the cadets discussed the weight of sacrifice. It was the dawning of the cadets' understanding of Jonathan Shay's (1994) observation that, "We can never fathom the soldier's grief if we do not know the human attachment which battle nourishes and then amputates." Reflecting on the day, one cadet emphasized the educational value of the experience: "Military history must be studied in the same discomfort as those who lived it experienced it. And discomfort does not imply merely a physical element. The emotional discomfort present this morning pervaded the entire day."[15] They also noted the disturbing proximity of the living to the dead. Stand-to and funerals were both part of the regular routine. So after burying their friend, the young lieutenants simply turned and walked back to their trench; and so did the cadets.

As cadets studied individual experiences from across the war, a greater comprehension of collective national memories emerged. The following day, cadets carried their study of memory to the Memorial to the Missing of the Somme at Thiepval. Carved into the stone walls of the memorial are over 72,000 names of British and South African soldiers with no known grave. Unlike at the French, German, and American memorials and cemeteries the cadets visited, they learned that every soldier of the British Commonwealth who died or is missing has his name carved somewhere on the battlefields of the Western Front.

The goal was individual recognition, but the cadets struggled to find any individuals emerging from endless walls of endless names. One year, troubled by it all, the youngest cadet began to speak. Her back to the memorial and her face to the French countryside, she slowly admitted, "I don't understand any of this. This place is so beautiful; how can there be so much pain and so much beauty in one place?"[16] It was a breaking point of emotional exhaustion for everyone. Although the cadets acknowledged a national imperative to commemorate individual sacrifice, they had seen every possible way of doing it and had concluded that none of it was satisfying. None of it was right. Nothing could compensate a family for the loss nor assuage their grief.

Outcomes

By learning of the personal and national tragedies suffered in the fight to liberate their territory, cadets were better able to understand Belgium and France's response to German invasion in World War II. Likewise, studying the experiences of German soldiers illuminated the common belief among veterans after 1918 that a victory had been betrayed. It put the British interwar determination to resist the pull of future continental stalemates into perspective. The massive celebratory monuments erected by the United States in France following the war found congruence with the late arrival of the American Expeditionary Force, and it also explained American attitudes about the war that persist today. The cadets learned that national identity emerged from the war, too, not only on the European continent but elsewhere as well. Studying the experiences of Ireland, Australia,

15 Cadet Robert Koontz, personal journal reflections on the staff ride, 2016.

16 Cadet Grace Gomez, conversation with the author at the Memorial to the Missing of the Somme, Thiepval, France, 2016.

New Zealand, India, South Africa, Canada, Newfoundland, Morocco, Senegal, and Vietnam on the Western Front revealed national memories that are tightly woven into the narratives of those nations today.

Throughout the study, the officers leading the staff ride offered their own stories of war and loss, reinforcing the cadets' observations and making it all the more personal and enduring. As cadets saw their officers struggle with words and memories, they truly began to wonder how they would serve and lead. They considered, most for the first time, how they might respond to their own losses. They listened intently as an officer described serving as a rear detachment commander and casualty notification officer, visiting families he had come to know and love, and then delivering the news that shattered their world. With discussions moving back and forth from the past to the present, the cadets began to truly comprehend the gravity of the path they have chosen, and they were humbled. "I can feel the past, present, and future collide in a way I haven't quite experienced time before," one cadet said.[17] They wondered if they would ever be prepared to lead others and concluded that they must be. Returning home, they began to reflect on previous lessons from the classroom, the training field, and the barracks, and they have begun to synthesize a new understanding from it all.

Department of Military Instruction: the research staff ride

In 2014, a faculty member from the department's Defense and Strategic Studies program stumbled on a sepia-toned picture, taken in 1919, of cadets about to depart for a Great War staff ride, and it begged the question: *If we traveled to battlefields to study contemporary conflict in 1919, why don't we do that today?* That photo marked the beginning of what would become the Contemporary Battlefield Staff Ride: a research staff ride to a recent conflict. While it may not be prudent to send cadets to Afghanistan or Iraq, there are many other recently completed conflicts where cadets can travel to learn valuable lessons about fighting in the complex contemporary environment that remain understudied.

Gettysburg and Normandy can still provide lessons on leadership, strategy, and principles of war, but they provide little insight how cyber, information operations, unmanned aerial vehicles, or suicide bombers have reshaped combat. This kind of study, by contrast, provides tactical as well as larger strategic lessons; if policymakers and military professionals had a better understanding of the 2008 Russian-Georgian War, they might not have been surprised with the Russian seizure of Crimea in 2014.

Since 2015, Defense and Strategic Studies and Modern War Institute faculty, supplemented with faculty from the Department of Social Sciences and Army Cyber Institute, have carried out a series of staff rides of recent interstate and intrastate conflicts where hostilities have ceased and the terrain is safe to traverse, yet the scars of war remain visible and the fighters still live. This allows students to visualize the modern battlefield, interview field commanders, discuss its key battles with actual combatants, and discuss lessons for the current character of warfare. Our modern take on the traditional Army staff ride offers cadets a dynamic way to bridge the theory they learn about war and international security in the classroom – from Clausewitz to Cold War deterrence – with presentations, vignettes, and lessons from the contemporary battlefield.

17 Cadet Claire Jones, personal journal reflections on the staff ride, 2018.

Design and execution

A contemporary battlefield staff ride is like a traditional staff ride, but with one major difference: there is no *Staff Ride Guide: Battle of Antietam* (Ballard, 1987) or *Major & Mrs. Holt's Battlefield Guide: Normandy Landing Beaches* (Holt & Holt, 1999) for recent conflicts that can be pulled from the shelf and followed. Thus, it is a research staff ride – a retrospective case study – that is largely created from scratch each time.

Our first step is determining where to go and what to study. For example, when our goal was to better understand Russian hybrid warfare and how to deter Russian aggression, then studying the 2008 Russian-Georgian War, Ukraine's current conflict in the Donbas, or studying the Baltics' attempts to deter Russian aggression were ideal locations.[18] When the goal was to gain a better understanding of how to end a long-running insurgency – something extremely relevant given current efforts in Afghanistan – then Sri Lankan and Colombian civil wars were perfect conflicts to study.[19] To study terrorism and urban warfare, we traveled to Mumbai. To study siege warfare, we traveled to Sarajevo.[20]

Our next step is building the syllabus, research plan, logistical plan, and itinerary. These are all separate yet interrelated requirements. We conduct most of our contemporary battlefield staff rides as for credit, three-credit hour courses in the summer, typically lasting three weeks. The syllabus includes a mix of relevant theory, research methods, and articles on the conflict that is being studied. The foundation of our staff ride is theory, whether related to the causes of war (e.g., security dilemma), why wars are hard to end (e.g., credible commitment issues), or why wars endure. Grounding the staff ride in theories of international politics helps students understand how important lessons of the battle impact the larger strategy behind the overarching campaign. It also enables them to ascertain whether the war upholds or disproves various theories of interstate or intrastate conflict.

Since there is no existing staff ride guide, there is a heavy research requirement. We want our students to interview belligerents from both sides – yet few have had a research methods course at this point in their curriculum, so we provide our cadets a crash course in qualitative methods and anthropology that includes best practices in interview techniques, ethics, observation, and data gathering. It is important they have at least a basic level of ethnography to maximize learning during various interviews, observation of places where key events took place or remnants of the war remain (e.g., refugee camps), and a careful reading of as much primary material as possible (public testimony, oral histories, speeches by public officials, memoirs, etc.).

Our syllabi include sources that convey both sides of a conflict. We try to maintain a fair and neutral portrayal of the war to avoid "priming" students or biasing their opinions before arriving in country for their research. This allows them to wrestle with the facts on

18 Lionel Beehner et al., *Analyzing the Russian Way of War: Evidence from the 2008 Conflict with Georgia* (West Point, NY: Modern War Institute, 2018); Lionel Beehner and Liam Collins, *Dangerous Myths: How the Crisis in Ukraine Explains Future Great Power Conflict* (West Point, NY: Modern War Institute, 2020).

19 Lionel Beehner et al., *The Taming of the Tigers: An MWI Contemporary Battlefield Assessment of the Counterinsurgency in Sri Lanka* (West Point, NY: Modern War Institute, 2017); Lionel Beehner and Liam Collins, *Welcome to the Jungle: Counterinsurgency Lessons from Colombia* (West Point, NY: Modern War Institute, 2019).

20 Michael Jackson et al., *Contemporary Battlefield Assessment – Bosnia and Herzegovina* (West Point, NY: Modern War Institute, 2015).

the ground and how they might have acted based on the environment, military capabilities, doctrine, and level of discipline among units.

During the field study phase, we set up interviews with as wide a variety of sources as possible; this includes ex-combatants from both sides, senior military and political leaders, local military leaders, NGOs, ambassadors, and the victims. In northern Sri Lanka, at a beachside Tamil BBQ, a Tamil (Christian) priest bedecked in a white robe explained to cadets why he felt suicide bombing is justified. Likewise, our students were particularly moved by a Tamil widow's moving testimony of how her husband was snatched by a white van only weeks before the end of the war and, years later, the government had yet to acknowledge having taken him.

For many contemporary battlefield staff rides, there are few Omaha Beaches or Little Round Tops, well-known locations where pivotal battles were fought with maps that can easily be followed to reenact the battle. Thus, one must determine the stands – the battle, event, or possibly a function (such as cyber, signals, or logistics) – where the group will stop at to discuss, such as WWI's Cambrai or Gettysburg's The Peach Orchard. A normal staff ride can include several dozen stands, but for staff rides of modern wars, we typically narrow it down to only a small handful and assign the stand to one of the students to brief. A stand could be a tactical battleground, such as the Battle of Kilinochchi in Sri Lanka,[21] or functional, such as a discussion of cyber warfare while standing near the Bronze Soldier memorial at the Tallinn Military Cemetery. The movement of the Soviet World War II memorial by the Estonian government to a cemetery on the outskirts of town triggered a Russian denial of service attack that crippled government and banking systems.[22] Thus, it was a perfect location to discuss cyber warfare.

Because of the nature of these types of wars – asymmetric, fought across multiple domains, unclear frontlines – almost inevitably they will be driven rather than walked. Also, in today's wars, clearly delineated frontlines are rare and positions often fluid. There are few Pickett's Charges in modern war. This makes it more difficult to visualize where individual stands should take place to operationalize the battlefield. That goes in spades for touring the battlefields of guerrilla wars or wars fought across multiple domains (how does one tour, say, fiber-optic cables?). To mitigate this, we conduct good map planning to determine the best locations to stop to study the tactical option.

We leverage outside experts throughout our research staff rides. During the preliminary study phase, we conduct video teleconferences with experts (e.g., historians or think tankers with policy expertise). In country, we conduct dozens of interviews with a wide variety of subjects. Together, they provide a level of context, analysis, and engagement that a textbook cannot. Students should understand the nuances of the region's history, leaders, social practices, economy, values, and customs. Given we rarely have the luxury of being able to travel to the country prior to the research trip, we often arrange for a local "fixer," someone familiar with the area, to assist in previewing the locations of stands, translating, and providing local context. On occasion, we have also included

21 Beehner et al., *The Taming of the Tigers*.

22 Francis Tapon, "The Bronze Soldier Explains Why Estonia Prepares For A Russian Cyberattack," *Forbes*, July 7, 2018.

a researcher – a postdoctorate, for example – who is a subject matter expert unaffiliated with West Point.

These types of staff rides are logistics-heavy, and there are obvious security issues to consider, as there are parts of post-conflict zones, such as the Balkans or Middle East, still littered with unexploded ordnance. In Georgia, for example, the police nearly arrested one of our instructors who ended up getting too close to the Administrative Boundary Line between Georgia and its breakaway region of South Ossetia. Extreme caution should be taken when traversing these battlefields. In other cases, the U.S. Embassy has directed us not to visit certain cemeteries, as some may incorrectly interpret the visit as some kind of a diplomatic message given we are US government employees.

The in-country classes, stands, interviews, logistical constraints, and cultural excursions are all considered when building the itinerary. We structure the itinerary so there are no large gaps in the schedule yet try to remain flexible enough to account for inevitable delays – meetings starting late or going long, bad traffic, or getting lost – or late additions to the itinerary. On a typical day, we usually start with an hour of classroom time in the morning (at the hotel), followed by either interviews or meetings with officials, academics, journalists, or locals, with immersion or observation in the afternoons or evenings. We often conclude the day with group dinners, which provide a great opportunity to discuss and reflect on the day's interviews.

Similar to other staff rides, we conclude ours with an integration phase, which contributes to student grades. During the field study phase, students are graded on the stands they run, the contribution they make to the "classroom" discussion in the mornings or at dinner in the evenings, performance during interviews, or on assigned reflection papers. During the integration phase, we ask our cadets to focus on one central question or tackle multiple ones. In the Baltics, after hearing all three governments explain their defense and deterrence strategies, we asked cadets: "OK, so if you were Putin, which Baltic State would you least want to invade and why?" In Georgia, we divided cadets into two groups: one delivered a short presentation on how the 2008 Russia-Georgia War fit into the literature on "ungoverned spaces," and the other group discussed the war's information operations campaign. In Colombia, cadets tackled the complex issues of paramilitaries in counterinsurgency operations, the nexus of crime and insurgency, and challenges with the reintegration of former guerrillas into society.

Outcomes

To measure if deeper learning resulted, we assigned reflective essays, conducted student surveys (both pre-and post-staff ride), and conducted after action reviews to measure how the experience prepared them for other relevant coursework. Cadets' reflective essays were particularly rewarding to read: it was clear how much they had learned, how the study had personally impacted them, and how it had reshaped their views of modern warfare and the importance of studying academic theory.

The feedback has been overwhelmingly positive. Students tend to marvel at the candid responses they get from the victims of war but also are surprised from the human side of some of the senior commanders we meet. An example was how a senior Sri Lankan navy admiral appeared almost to admire the tenacity of the Tamil Tigers he fought for over two decades and even appeared to justify their use of suicide bombings against military targets as within the norms of acceptable practices for wartime. It is these kinds of candid

interactions with the actual participants of modern combat that cadets will never get inside a classroom or from any textbook.

> As a mechanical engineering major, my experience in Colombia challenged me to apply engineering skills – such as breaking down a problem, analyzing a situation methodically, and gathering data – in the context of foreign affairs, and the trip inspired my passion for international studies,

remarked one cadet.[23] Another cadet added,

> I cannot begin to go into depth about all that we covered and learned while abroad. However, I can say just how beneficial the experience will be to my future career. I saw for the first time how important visiting firsthand and being immersed in the region can be. It is one thing to read and talk about it, and a far greater thing to go and experience it firsthand.[24]

Department of Law: the Civil Rights Staff Ride

Long before the Department executed its first Civil Rights Staff Ride, the challenge of teaching empathy was coming into focus. Empathy is defined in many ways by scholars, but for the staff ride it meant humanizing others.[25] The Department had sent cadets to visit sites where war crimes had been committed in Europe, such as Srebrenica or Dachau, and observe consequences to the rule of law after years of civil war in Liberia, but the immediacy of those issues seemed to be lost on the participants upon their return. That is not to say that the cadets who had been exposed to those places did not express sympathy; they just were not immersed deeply enough in those experiences to a degree needed to gain empathy.

The use of the staff ride model was a perfect fit for this effort. The long civil rights movement, which began when the first slaves were brought to America against their will, precipitated a series of pitched battles, with both traditional and nontraditional battlefields, with "generals" and with foot-soldiers.

The Civil Rights Staff Ride was created to produce empathy. The hypothesis was that taking cadets to meet with civil rights movement veterans and to visit, stay, and eat in the places where their stories played out would create empathy. The United States Military Academy has identified diversity as a core principle of leadership, and if successful, this experience would enhance the effort to inculcate that value among the Corps of Cadets.[26] On a fundamental level, the Obama presidency had spawned the myth of a post-racial society, but as we learned during our first Civil Rights Staff Ride in 2013, the report of the death of racial discrimination was an exaggeration, to say the least.

23 Cadet Truman Gabriel, end of course feedback from contemporary battlefield staff ride to Colombia in July 2018.

24 Cadet Max Sechena, end of course feedback from contemporary battlefield staff ride to Colombia in July 2018.

25 Benjamin M. P. Cuff et al., "Empathy: A Review of the Concept," *Emotion Review* 8, no. 2 (2016): 44–153.

26 "SUPT's Priorities," PowerPoint Presentation (West Point, NY: United States Military Academy, July 2015).

Design and execution

Like the other nontraditional staff rides described in this chapter, the Civil Rights Staff Ride has grown into a three-credit hour course, lasting three weeks. The "stands" were well-planned, but open space was built into the itinerary to leverage chance encounters and to provide time for group discussion and personal reflection. A major difference between this staff ride and previous ones that the department had done was that cadets were well-prepared in advance for every stand and meeting. We accomplished this by adding a week of classes before we departed and a nine-page syllabus rife with required readings. The field study lasted two weeks, using a single van for transport.

Like the others, this staff ride was pointedly multidisciplinary. Over its seven years, classes have been taught by faculty from the Departments of Law, History, English and Philosophy, and Math. We selected plebes (freshman) to participate based on their enthusiasm and commitment to undertake the rigorous academic requirements. As college freshmen they shared one thing in common: they had little civil rights education, but they were hungry to learn.

For the first two years, the battles we studied were largely historical. It was the fiftieth anniversary of the modern civil rights movement and there was no shortage of participants still alive to meet with cadets and tell their stories. We also experimented with cultural immersion, hoping to use local cuisine, music, and literature to help develop empathy. Cadets' after-action reviews indicated this experiment worked. One cadet commented that the staff ride had been a "life-changing experience."[27]

Immediately after our second trip in the summer of 2014, the controversy that swirled around the killing of Michael Brown by a police officer in Ferguson, Missouri, raised troubling questions. This incident and the video that documented it was followed in rapid succession by videos of police encounters with African Americans that challenged the Civil Rights Staff Ride to examine current events. Understanding the complex question of race in America would require a level of academic rigor that could only be expected of cadets in a credit-bearing course.

In 2015, the staff ride became a three-credit hour course, and the syllabus was expanded to include additional books and articles. We also required cadets to read judicial opinions and poems, listen to music, and watch eight films. The level of academic rigor for this course was high. With interviews and writing assignments, the method of cadet selection apparently was well-suited to this challenge; alumni of the staff ride have included two Rhodes Scholarship finalists, a Marshall Scholar, a Truman Scholar and two cadets who earned scholarships to attend MIT.

The effort to focus on current events did not sacrifice the determination to understand the historical and legal underpinnings of those events. It did, however, add a level of complexity to link a longstanding system of legalized discrimination to current conditions in minority communities in the United States.

We also redoubled our efforts to immerse cadets in culture and to build empathy. Readings were chosen with the explicit purpose of doing just that. The best example is perhaps Gilbert King's Pulitzer Prize-winning book *Devil in the Grove*.[28] The book describes the "battles" over civil rights that were taking place in Florida in the late 1940s

27 Kathy Eastwood, "Taking an Untraditional Historical Staff Ride," *The Pointer View*, July 11, 2013.

28 Gilbert King, *Devil in the Grove: Thurgood Marshall, the Groveland Boys, and the Dawn of a New America* (New York, NY: HarperCollins, 2012).

and '50s. Previously, these battles were not in the forefront of our collective memory about the civil rights movement. To fully understand the extent of the movement in Florida, King visited the cadets to discuss the case of four African American men charged with allegedly raping a white woman in Groveland, Florida. Three of the men were tortured in the basement of the Lake County Courthouse for confessions, and all felt the brutal injustice of the Sheriff (the "Devil"). Other books eventually included Bryan Stevenson's critically acclaimed *Just Mercy: A Story of Justice and Redemption*, and Ta-Nehisi Coates' National Book Award winner, *Between the World and Me*.[29]

To understand this case, and the many others like it in the decades since, we visited with relatives of the men and walked through the different locales mentioned in the book. To understand the contemporary implications, we also met with the current Lake County Sheriff and members of the community. To further create empathy, we traveled the route that defense attorney and future Supreme Court Justice Thurgood Marshall took on his train ride from New York to Florida. That route took him from Harlem, where he was a well-respected attorney, to Lake County, where he was a second-class citizen.

Our staff ride traveled that same route; we, however, drove the van until loading it onto the Auto Train in Lorton, Virginia. As we passed Baltimore's airport, we ensured cadets realized that in 2005, its official name was changed to Baltimore-Washington International Thurgood Marshall Airport in honor of the Baltimore native.

The focus on current events drives us to visit places where battles have been recently precipitated. In 2016, we visited the Mother Emmanuel AME Church in Charleston, South Carolina, where we joined in the congregation's Thursday evening prayer meetings barely a year after an armed gunman burst into the same service, killing 11 congregants in the hopes of starting a race war. In 2017 we visited Charlotte, North Carolina, where rioting erupted as the result of a police shooting. There, faculty and cadets met with the police chief and city manager. Each of these encounters added to the cadets' understanding of the conflicts, not just the course-of-battle but the root causes, along with their implication for the resolution of past inequities.

Each staff ride has its own theme. In 2018 the last stop visited was Charlottesville, Virginia, in the aftermath of a violent and deadly incursion by white supremacists and neo-Nazis. There we met with the dean of students at the University of Virginia. Circumstances had placed him in the middle of that battle, protecting his students while surrounded by the rabble spewing racists chants and bearing tiki torches as weapons. During the melee, the dean was struck by a torch that was hurled at him like a spear.

The theme for that trip was "changing the narrative," which reflected on how false narratives of hatred and bigotry seem to have been reinvigorated in recent years, enabling behavior like that seen in the Charlottesville riots. The cadets who heard the story understood this. As one cadet related in his final blog about the 2018 trip,

> I feel motivated to continue righting wrongs and injustice within society, and I am confident in our ability to do so. As I stated earlier, I am not sure I can accurately describe the emotion or enlightenment I gained from this trip. What I do know is our intellectual pilgrimage throughout the south changed us for the rest of our lives.[30]

29 Bryan Stevenson, *Just Mercy: A Story of Justice and Redemption* (New York, NY: Spiegel & Grau, 2014); and Ta-Nehisi Coates, *Between the World and Me* (New York, NY: Spiegel & Grau, 2015).

30 Maxwell Myers, "Cadet Reflection – Cadet Maxwell Myers – June 9, 2018," retrieved from https://usmacivilrights.wordpress.com/2018/06/.https://usmacivilrights.wordpress.com/2018/06/.

Outcomes

The original objectives for the Civil Rights Staff Ride were for cadets to not only achieve empathy but also appreciate the struggle of another era and understand its reverberations today. Moreover, cadets were made aware of the impact of the staff ride on their anticipated military careers. One future Marshall Scholar reflected on his experience and its relationship to his future career as a military officer:

> This Civil Rights Staff Ride helped me understand the complexities of the Civil Rights Movement in a much more sophisticated way. . . . Is this knowledge applicable as we look forward to our future as junior officers? It was the in-the-field leaders who had to act as coordinators between different factions and between national and local situations. They had to reconcile the overall vision of the movement and its leaders with the actual realities on the ground because those working at the national level could not make realizable gains without the activities in the field. While the operations and battlefields I will face as an aspiring junior officer will be vastly different than those of the Civil Rights Movement, there seems to be a definite commonality in the importance of junior leadership. They are the ones implementing common goals by interpreting local conditions and taking appropriate action. They are the foundation of the actual combined progress.[31]

Another cadet, a Rhodes Scholarship finalist, remarked:

> My experience on the Civil Rights Staff Ride was nothing short of life-changing. I initially hoped to invigorate my love for history and get a first-hand account of the status of civil rights today. However, what I ultimately gained was a completely new perspective on the innumerable victories Americans have won in the political, social, and economic realms since the commencement of the republic. Perhaps more importantly, I became more keenly aware of the challenges we continue to face today, primarily culturally and socio-economically.[32]

Importantly, we have also found the development of cadets' character, which remains a stated priority of West Point's superintendent, a welcome outcome of the staff ride. We solicited current Army officers who participated in the staff ride as cadets to assess this impact. One platoon leader remarked:

> The bottom line is that the staff ride focused on history that occurred decades ago, but also in the present day – and that's what matters, because history tends to repeat itself. The key takeaway I took away from the staff ride in relation to character/officership is to listen and to acknowledge when something isn't right. I always ensure my Soldiers understand their educational opportunities the Army provides and that there is zero room for unfair treatment of any kind. I think in a way the staff ride helped re-enforce that concept. Something about hearing stories from citizens who experienced hardships due to discrimination, the integration process, and be able to

31 Cadet Ian Mauldin, reflection essay, September 28, 2013, on file with author.

32 Cadet Erica MacSwan, reflection essay, American and African American Identity, September 28, 2013, on file with author.

> talk about their experiences is why the trip mattered so much. In the end, the Army is a people business and no two people are the same.[33]

Another former cadet, who earned a scholarship to MIT and is now an aviation officer, wrote:

> The staff ride opened up an entirely new area of interest in assessing the effects of discrimination in both the past and in a modern context. Seeing how truly disadvantaged some people are due to unjust causes has developed in me a greater level of empathy that I continue to use as a leader. The Civil Rights Staff Ride is a truly unique experience to critically assess the impact of discrimination, especially in the modern era. I will never forget the countless hours of passionate discussions in the long van rides over current social inequalities, including their prevalence, causes, and potential solutions.[34]

These staff rides also provide the unique opportunity for faculty to model proper character and behavior to the cadets, which is emblematic of experiential learning at West Point. Taking advantage of the opportunity to exemplify and instill character to our cadets over the two-week immersive experience is now a stated goal in the syllabus.

Conclusion

Traditional military staff rides let students at any level engage in military history – from assuming the persona of key decision makers to walking and visualizing the terrain – in a way that reading textbooks in a classroom cannot. Even though armies no longer launch Napoleonic assaults, these battles can be unpacked in staff rides to understand the enduring lessons of war, from leadership to flanking maneuvers. There are, however, limitations. Joshua Chamberlain's bayonet charge on Gettysburg's Little Round Top can teach us something about bravery and courage, but it has little application to an officer confronting unmarked "little green men" in Ukraine or combatting a sophisticated cyberattack.

To teach the lessons of conflict, from leadership to empathy to tactical awareness, outside of the classroom, a useful pedagogical tool is nontraditional and research staff rides. Yet they still follow the basic format of a successful traditional staff ride: a rigorous preliminary study phase followed by a well-planned and executed field study phase, with an integration phase to lock in the learning. While nontraditional staff rides require significant planning and logistical support, deep knowledge of a country or city's history, intellectually curious students, and a flair for improvisation, the learning potential is immense. These types of staff rides are part military historiography, part ethnography, and part cultural immersion. What they all share is an emphasis on a different, and arguably deeper, form of learning that is unavailable through textbooks or traditional classrooms.

While it is comforting to see that the use of the staff ride outside of the military has expanded it recent years, it remains an underutilized pedagogical tool. The experiential

33 First Lieutenant Michelle M. Kokoski, e-mail, September 18, 2019, on file with author.

34 First Lieutenant Adam F. Reynolds, e-mail, September 12, 2019, on file with author.

learning that takes place through the preliminary, field, and integration phases can be particularly effective at creating new learning. Whether over a long break or a summer recess, nontraditional staff rides are a useful tool to provide context and deeper learning and can be applied to range of academic subjects and disciplines. Those 19th-century Prussian officers were proficient in creating this form of pedagogy. It is for the next generation of scholars and instructors to move staff rides into the 21st century.

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Epilogue

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Teaching and learning in a COVID-19 world

Lynnan Mocek, Raymond A. Kimball, and Rebecca Jones-Kellogg

The COVID-19 pandemic struck West Point as this volume moved into production. Like higher education institutions around the world, West Point moved online expeditiously and began to negotiate the challenges of a dispersed student body, faculty, and staff. A detailed description of West Point's response to COVID-19 could fill another entire volume. This epilogue is intended instead to highlight key areas of West Point's teaching and learning response to this unprecedented event.

The immediate response

Because West Point had no courses that solely relied on distance education when the pandemic forced a move to remote teaching, the academy had to craft its response almost entirely from scratch. West Point met the immediate need of resuming instruction via emergency remote teaching by ensuring that cadets and faculty alike had the necessary tools to meet minimum standards of instruction. The Brigade Tactical Department assessed and identified the material needs of cadets and met them through extraordinary measures such as mailing laptops to cadet home bases (quarantining began during spring break in March 2020). Other cadet support agencies rapidly pivoted to place critical infrastructure online for cadet use. This included tutoring mechanisms through the Center for Enhanced Performance, coaching via the Mounger Writing Center, and library support for both guidance and free resources. Faculty participated in training sessions run by educational technologists and the Center for Teaching Excellence designed to orient them to the capabilities of Microsoft Teams and Blackboard, both of which were designated as the learning management systems of choice for the remainder of the semester and into the summer and fall. Recordings of these sessions and other emerging best practices were made available via a newly created online Remote Teaching Portal. Departments designated experienced faculty who could integrate discipline-specific needs with emerging technical capabilities to best support teaching requirements as Remote Learning Points of Contact. All of this was backed with support at the highest levels of academy leadership for innovations in course content delivery and sustained connections with cadets. For example, the dean mandated an initial, synchronous "face-to-face" connection in all classes, followed by an emphasis on grading with compassion that accounted for extraordinary social circumstances. The latter gave faculty the flexibility to adjust to individual cadets.

Figure E1 A West Point instructor conducts a class with COVID-19 mitigation measures in place, including masks, social distancing, and rigorous sanitizing of hands and horizontal surfaces.

Adjustments through the semester

While these actions met the immediate need for a transition to remote teaching, they had to be continuously refined and adjusted as conditions continued to evolve. One vital mechanism for this effort was the use of multiple comprehensive, anonymous surveys of cadets and faculty asking about preferred platforms, shortfalls in learning conditions, and critical gaps in capabilities. On the cadet side, these surveys were buttressed with the new Cadet Alert System, an app that provided a common operating picture of student challenges to faculty and staff involved with those cadets. A daily Academic Officer in Charge visited the study conditions of the handful of cadets who had remained at or returned to West Point during this period. Faculty used a Remote Teaching Discussion Forum where they could ask questions of each other in an informal setting and share emerging ideas and techniques for remote teaching. As it became clear that remote teaching would persist for the remainder of the semester and beyond, the dean's staff published critical updates to academic policies that gave faculty badly needed flexibility. These policies included an extension of the withdraw/no credit timeline, adjustments to final exam guidelines, and clear statements of the anticipated level of disruption for the course. Key takeaways from these efforts were published in weekly Remote Teaching Best Practices reports and then circulated to the entire academy, as well as selected Army partners who were also struggling with remote teaching.

Looking ahead

Many of these best practices led directly to sustained change efforts designed to prepare West Point for an extended period of difficult teaching in COVID-constrained conditions. Departments published end-of-semester syllabus updates that captured modifications to previously approved course structures, overall level of course disruption, additional factors of concern, and lessons learned. These syllabus updates, in turn, fed the standing programmatic executive summaries that inform academy-wide assessment efforts. Departments supplemented these documents with further dialogue during the Dean's Annual Offsite, a 100% remote session that was tightly focused on necessary adaptations for the rest of the academic year and the year to come. The offsite allowed senior faculty across disciplines to share what was working and what needed to be improved across the academic enterprise. The Vice Dean for Academic Affairs (Sondheimer) chartered a Remote Teaching and Distance Education Working Group, under the leadership of two new Dean's Fellows for Remote Teaching and Distance Education/Learning, that provided concrete suggestions for future online education efforts (a copy of the working group's report is available in this volume's companion website). Early feedback from the working group empowered West Point to purchase $300,000 worth of technology for faculty, addressing key capability gaps such as precision writing and whiteboarding in a remote environment.

As racial tensions rocked the country in late May, the Dean's Diversity and Inclusion team created the Listen, Support, Mentor, Coach online platform that allows cadets to confidentially voice their opinions and concerns and aids faculty understanding regarding cadet experiences and perspectives on racially related activities. Ultimately, this will help guide academy leadership on future initiatives for a positive change.

West Point is planning for an uncertain future as we bring in our next class of cadets and adapt our summer training and education for the current classes. While the pandemic forced our faculty to experiment with new technologies and create learning environments much different than in a traditional classroom, the experience also demonstrated that the fundamentals of good teaching apply in person or online. Teachers who demonstrate genuine care for their students, who create engaging learning experiences, and provide and receive regular feedback on the learning that is occurring inspired students even when this unprecedented disruption caused a dramatic change in the way the semester unfolded. The remote teaching experience exposed teachers to new ideas and methods of engaging students with course material that will improve the in-person learning experience, too. We will continue to evolve our practices and requirements and monitor the literature that is emerging[1] to ensure that we meet our core mission: producing commissioned leaders of character and preparing them for careers of professional excellence and service to the nation.

1 Rasheed Abubakar Rasheed, Amirrudin Kamsin*, Nor Aniza Abdullah. "Challenges in the online component of blended learning: A systematic review," *Computers & Education*, 144 (2020).

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